

Artificial intelligence as producer and consumer of copyright works: evaluating the consequences of algorithmic creativity

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Introduction

Artificial intelligence (AI) has been the subject of a great deal of academic interest in recent times; it has captured the attention of copyright lawyers fascinated by the thought of machines creating works of art, music and literature. There is no doubt that, as has often happened in the past during previous waves of technological advances, AI platforms—and especially, machine learning—have brought with them new opportunities as well as challenges. Machine learning is an AI application enabling programs to learn and progress automatically from experience. Its main feature is accessing data and often using it for the purpose of creating outputs, including music, literature, movies and art. Amounts of data are observed and analysed by the machine, which enables the latter to learn and then make creative decisions leading to final outputs that, as precise works of art, are often not foreseeable by the people who developed and started the initial program. Such a process is characterised by the absence of substantial human intervention or assistance after the program is operated, and by the use of algorithms—namely a sequence of instructions aimed at solving a problem or performing a computation.¹ It can be deemed “algorithmic creativity”, or the way by which AI/machines create new works.

Consider the example of JukeDeck—a program which employs machine learning to train its system in the rules of music theory, and composes music via an algorithm.² Customers can set parameters, such as music genre (e.g., jazz, blues, rock, ambient, chillout, etc.), main instruments, length of the tune, and speed (e.g., up-tempo, low-tempo). The track is then composed in around 20 seconds and made available to customers as an MP3 file.³ The Artificial Intelligence Virtual Artist (AIVA) is another example of an AI music composer.⁴ In June 2016 AIVA became the first virtual artist to be recognised by an authors’ rights society when it was registered as composer by the French collecting society SACEM.⁵ The use of programs like JukeDeck and AIVA is on the rise, pushing the boundaries of music creation.

In addition to music, AI can produce literature, including poems, novels and news articles.⁶ Take Brutus, a program that writes short stories, which are often intriguing, have a hint of mystery and are written in correct English prose⁷; or the Cybernetic Poet, software which allows a computer to write poetry by adopting the styles and vocabularies of human poets⁸ (this technology is also protected by a US patent).⁹ Technology developed by companies such as Automated Insights¹⁰ and Narrative Science¹¹ can be used to create automated narratives with no substantial human intervention; the former company provides natural language software, transforming data into narratives that can be read and appreciated, while the latter helps businesses to do internal and external reporting—e.g. high-volume reporting workflows by using (again) natural language generation (an activity which is usually time-consuming when it is undertaken by human beings).

AI is also capable of creating visual art. Examples abound: AARON, for instance, is a computer program produced by Professor Harold Cohen that generates artistic images by using real paint (not pixels) on actual canvases (he initially created the program in the 1970s and then developed it over time)¹²; Deep Dream is another popular computer vision program (created by Google) that employs a convolutional neural network to find and enhance patterns in images through algorithms, and then turns the images fed into the system into dream-like creations.¹³ Perhaps the best known example is the “Next Rembrandt” project—the generation of a new 3D-printed painting produced from data scanned from the famous Dutch maestro’s body of artworks.¹⁴ The project attracted media interest over the fact that the new portrait in the style of Rembrandt was completed using deep learning algorithms and facial recognition techniques. Algorithmically created artworks have recently been exhibited as part of a solo exhibition by a robot artist¹⁵; such works of art have even been sold at auction for significant amounts of money.¹⁶

There is no doubt, therefore, that AI technologies are capable of creating tangible and intangible outputs. If such musical, literary and artistic expressions were created by humans, no one would object to them being considered as copyright works. AI-created works are certainly capable of captivating an audience and stimulating emotions in a similar fashion to works of music, literature or art produced by human beings¹⁷; some AI-created works have even been accorded an economic value in the art market. Yet their **I.P.Q. 114* copyright status is doubtful in several jurisdictions precisely because these outputs are generated in large part (and sometimes almost entirely) by machines. The human(s) who triggered the automated process that led to the creation of the expression often have no idea how the ultimate work will look or sound. This “unforeseeability” seems to break the causal link between the humans who program or use these machines, and the final output produced by the

latter.¹⁸ In copyright theory, property rights are justified in large part by, e.g., the Lockean argument that the human has laboured to create the work; or in Kantian terms, by emphasising that the work arose from the personality of the human author.¹⁹ Such theories do not fit neatly with a non-human author.

Thus, as machines have learned to mimic human creativity, the copyright world has accordingly entered into AI-driven uncharted territory. We aim here to navigate through this territory, providing a road-map of what the legal repercussions of AI are, and guidance on what routes the law should take in the future.²⁰ Given the wide-ranging nature of the legal and policy issues raised in this article, we take into account the laws of several different jurisdictions, especially the US, the UK and the European Union (EU).

Is an AI-created work protected by copyright? Should it be? Who would be viewed as the author? Who should own such a work? These questions are the focus of the first part of this article: “AI as producer”. In the second part, “AI as consumer”, our analysis shifts to the questions of whether and to what extent the use of data fed into the system, for example to train the algorithms, may amount to copyright infringement, or may in certain circumstances be exempted under fair use, fair dealing or similar doctrines. In the third part we consider possible legal regimes for dealing with machine produced works including alternatives to copyright, such as a public domain scenario and a sui generis system. Finally, we provide our conclusions.

Artificial intelligence as producer

By any rational measure AI systems can be said to produce works creatively. Moreover, they do so in an accurate, logical and independent way, with the final output often consisting of something unpredictable to the humans who programmed the AI platform in the first place (as well as the user(s) of the AI).²¹ As with much content produced by humans, it is often the case that a key element of the creative process in AI-enabled works is based on randomness.²² So, is the final output generated by a machine protected by copyright—and, if so, who would be seen as its author (and owner)?

This is not a new question

The issue of whether computational creativity can be protected by copyright is not actually a new one, at least in the US. As far back as 1965, the US Register of Copyrights reported concerns to Congress about the rise of computer technology and wondered if and where the line between human authorship and computer production should be drawn.²³ More than a decade later, in 1978, the US National Commission on New Technological Uses of Copyrighted Works (CONTU Commission) reported on the issue and concluded that computers used to produce works were just “inert tools of creation”. The CONTU Commission remarked:

- “[t]his discussion may have stemmed from a concern that computers either had or were likely to soon achieve powers that would enable them independently to create works that, although similar to other copyrightable works, would not or should not be copyrightable because they had no human author. The development of this capacity for ‘artificial intelligence’ has not yet come to pass, and, indeed, it has been suggested that ... such development is *too speculative* to consider at this time.” (emphasis added)²⁴

What the CONTU Commission considered too speculative in late 1970s became commonplace only a few years later. Advances in computing technology prompted the US Congress Office of Technology Assessment (OTA) to issue a report in 1986 arguing that CONTU’s prior approach had been too simplistic and that computer programs were more than mere “inert tools of creation”.²⁵ Uncertainty still reigned, however, as in the same report OTA recognised that “we know that these works would be copyrightable if they were done by people, but we don’t know what to do with them if they’re done by computers”.²⁶

The developments in computational—and more recently artificial intelligence and machine learning—technologies in the subsequent decades have made the issues related to copyright in works created by machines more pressing. Academic interest in this topic has soared.²⁷ Many of these academic scholars are interested in the question we now turn to: who can be an author?

The authorship conundrum

The question of “who is the author” of the final machine generated output(s) is crucial because under most copyright regimes around the world the author of the work is also the first owner of the copyright. Ownership gives the author exclusive rights, e.g. to sell, license or otherwise control the work. Traditionally, authors have been human, and copyright’s rationales for recognising, rewarding and incentivising creativity through property have human authors in mind. By contrast, AI and machine learning technologies enable programmers and/or users (who might otherwise work as authors and artists in their

own right) to turn over control to a system that is self-contained enough in key decision-making abilities to operate autonomously.²⁸ Therefore, one could argue that automation in this field—in the form of a machine takeover of the creative process from humans—is antithetical to the concept of authorship underpinned by copyright.

The requirement for authors/artists to be human is an assumption common in many copyright regimes.²⁹ This principle is enshrined in international treaties such as the Universal Declaration of Human Rights and the International Covenant on Economic, Social and Cultural Rights. The former states that “everyone” has the right to benefit from the protection of the moral and material interests resulting from their works (art.27 UDHR and art.15 ICESCR). The use of “everyone” clearly suggests a necessary human element. Furthermore, several national copyright laws limit authorship to natural persons. Spanish law, for example, provides that the author is the natural person creating the work³⁰; French law suggests that only a natural person can be the author³¹; and German law provides that copyright protects the author in his or her intellectual/personal relationship to the work.³² Likewise, although there is no specific human authorship requirement in the US Copyright Act,³³ in the Compendium of its practices the US Copyright Office emphasises the importance of the human element in the creative process. The US Office only registers an original work of authorship “provided that the work was created by a human being”.³⁴

The US Copyright Office has been even clearer when it comes to works generated by new technologies, noting that “the Office will not register works produced by a machine or mere mechanical process that operates randomly or automatically without any creative input or intervention from a human author”.³⁵ Despite these provisions not having a binding effect,³⁶ they nonetheless demonstrate that the US copyright system takes an unfavourable view towards protecting AI- and machine-created works via copyright. This attitude has been visible since the early days of computer technological advance.

When in 1956 the US mathematicians Martin Klein and Douglas Bolitho tried to register the computer-generated song “Push Button Bertha”, the US Copyright Office refused the registration, adding that no one had ever registered music created by a machine³⁷; and in 1964 the same office refused to register a design for a tile floor because it had been produced by a machine using random geometric patterns, asserting that the design did not constitute the “writing of an author”.³⁸ A similar outcome was reached more recently by the Australian courts. In *Acohs Pty Ltd v Ucorp Pty Ltd*, the Federal Court of Australia considered that the underlying HTML code for information sheets generated by a computer program did not have any author, and therefore could not be protected by copyright.³⁹

In the US, the claims of “animal authorship” share some similarities with the claims of AI authorship. In a widely reported case—*Naruto v Slater*⁴⁰—involving copyright in a “monkey selfie” and the enforceability of the alleged copyright to prevent the photograph from being exploited, a Californian court rejected the argument brought by the plaintiff, the animal rights’ organisation People for the Ethical Treatment of Animals (PETA), that US copyright law does not prohibit an animal from being an author. The court held that, while animals had constitutional standing, they lacked equivalent standing to claim copyright infringement of, e.g., a photograph. A similar line of argument was adopted by judges in both the US and UK in a string of cases focusing on who the author is in situations where “celestial voices” may have played a role in the creation of the work (cases involving so-called *psychography*, namely automatic writing used for spiritualistic purposes and channelled from the spirit world). In these cases, when faced with claims of spiritual authorship, the courts concluded that only humans can own the copyright.⁴¹

Under European Union law there is no explicit authorship requirement; the concept of authorship in EU copyright law is linked to the originality requirement. In *Infopaq*, the latter has been interpreted by the Court of Justice of the European Union (CJEU) as requiring the work to be the “author’s own intellectual creation”.⁴² In *Painer*, the CJEU clarified that an intellectual creation is an author’s own if it reflects her personality.⁴³ This would be the case, the court added, if the author were able to express free and creative choices, i.e. a “personal touch”. This suggests that the originality requirement involves some degree of human authorship. This point is reinforced by a remark by Advocate General Trstenjak in his Opinion in *Painer*: “only human creations are ... protected”.⁴⁴ This statement does not bode well for the proposition that works created by a machine should be considered original and therefore copyright; rather, the view of AG Trstenjak confirms the personal and anthropocentric nature of the EU copyright regime—a characteristic embedded within the civil law countries of continental Europe that have historically focused on the *droit d’auteur* approach to authorship as emblematic of human creativity and personality.

In the European context what would be required in order to assess AI-produced works as “original” is an objective interpretation of the originality requirement (which clearly does not fit into the current EU *acquis* on this test). Put simply, it would require looking at the final output per se—regardless of whether there has been involvement of a human being in its generation. In a recent case in Shenzhen, a Chinese court that considered a series of AI-produced news articles to be copyright appears to have taken this very approach.⁴⁵ Thus, the objective interpretation undertaken by a judge, considering the

field of art and public to which it is addressed, as well as its closeness to pre-existing works, would be the crucial factors for the purpose of determining originality. This would evidently shift the focus from a subjective intention of the human author (which Justine Pila has argued in favour of⁴⁶ and cases such as *Lucasfilm* align with),⁴⁷ but which is obviously absent in circumstances where robots create independently/autonomously) towards the objective opinion of viewers or listeners of the work.⁴⁸ Nevertheless, as mentioned, the current EU originality requirement actually requires a human touch in the generative process, which inevitably makes any objective interpretation of this test difficult if not impossible.

How to face the authorship issue—the “work made for hire” and “adaptation” approaches

A novel way to deal with the authorship issue may be to consider outputs created by AI as equivalent to works produced by employees in the course of their employment (or by independent contractors). In these circumstances (for example, under US law) the copyright remains with the employer or the person who has commissioned the creation, who are deemed authors of the final output. This is known in US law as the “work made for hire” doctrine,⁴⁹ namely a legal fiction that implements a policy decision to sidestep the real author to attribute copyright to someone else.⁵⁰ Put differently, this doctrine confirms that a person or entity that has not played an active role in the generation of the output is treated as the author of a work actually produced by another person (i.e. a human employee or contractor).⁵¹ If we extend this doctrine to output produced by AI or robots,⁵² the author of the works would be the person that merely triggered the creative process (without any substantial creative role in shaping the final work).

The extension of the “work made for hire” doctrine to algorithmic creations is not unproblematic. A machine cannot be compared to an employee, as the former is not given a salary or paid annual leave (and cannot join a trade union).⁵³ Human employees have legal rights and duties under agreements entered into with their employers. The machine “employee”, on the other hand, cannot be considered as entering into an employment agreement, nor is a computer capable of asserting legal rights.⁵⁴ The fact that programmers or users of a machine “employ” the latter for creative purposes—the argument goes—does not make the robot an “employee” capable of triggering the “work for hire” legal fiction. Moreover, applying the doctrine in question to AI-produced works would invert the very purpose of the doctrine, which is to consider a work created by a human being (e.g. an employee) as authored, via a legal fiction, by another entity which is not human (e.g. the employer/company). Conversely, extending this doctrine to the results of computational creativity would end up considering a human person (e.g. a programmer or user of AI creative technology) as author of the output generated by the machine (i.e. a non-human entity).⁵⁵

Could an output created by AI be deemed to be a work derived from the computer code which initially created that AI? The argument would be that the work in question is based upon a pre-existing work, namely the computer code. Unfortunately, this is a weak argument, as the output of an AI generative process often does not have features similar to the ones which characterise the underlying code of the AI. Even the US CONTU Commission accepted that computer-generated works are “entirely separated” from the underlying program.⁵⁶ For example, an output generated by AI may frequently not embody recognisable blocks of expression taken from the underlying program or from the data the program uses in the creative process.⁵⁷ The resulting AI output is often not based upon, or derived from, the code of the underlying program: in fact, the output is produced by the AI itself.⁵⁸ It cannot, therefore, be a derivative work under US Law (or adaptation under UK law) as the latter should include elements extracted from the pre-existing work.⁵⁹

The UK “pragmatic” approach—considering “the person by whom the arrangements necessary for the creation of the work are undertaken”

A pragmatic approach is visible in the [UK Copyright, Designs and Patents Act 1988 \(CDPA\) s.9\(3\)](#), which provides that “[i]n the case of a literary, dramatic, musical or artistic work which is computer-generated, the author shall be taken to be the person by whom the arrangements necessary for the creation of the work are undertaken.”⁶⁰

The [CPDA](#) defines a computer-generated work as one generated by a computer in circumstances where there is no human author.⁶¹ A few other common law jurisdictions have followed this approach.⁶²

[Section 9\(3\) CDPA](#) essentially introduces a legal fiction. It considers the author a person who has not directly created the work, but has merely made the necessary arrangements for such production to take place. In this sense the provision expands the notion of author,⁶³ taking into account the objective creation of the output, and then locating the most plausible nearby “author” (and owner), which could also be a company.⁶⁴ This provision could plausibly be extended by courts to cover AI-produced output. One criticism of doing so is that it would set the stage for an expansion of corporate ownership of copyright works, something evident in the recent decision of the Chinese court in Shenzhen, referenced above.⁶⁵

Provisions such as [s.9\(3\) of the CDPA](#) evidently constitute an exception to the originality requirement as it has been historically interpreted by UK courts.⁶⁶ Traditionally under UK law a work was considered original if it was the result of its author's own "skill, labour and judgement"—though post-*Infopaq*, the "intellectual creation" test has been used by UK courts. In any event, in AI scenarios the works produced (by a machine) do not directly originate from any author employing "skill and labour"—or indeed, "intellectual creativity"⁶⁷—unless the machine itself is considered an author (a point we reflect on later on in this article).

The legal fiction created by [s.9\(3\) CDPA](#) is not an isolated phenomenon in UK copyright law. [Section 9\(2\) CDPA](#) also considers as "author" the producer of a sound recording, the producer of a film (together with the principal director), the person making the broadcast and the publisher of a typographical arrangement of a published edition.⁶⁸ Such "authors" (e.g. producers) are actually often tied via contract to corporate entities (e.g. record companies).⁶⁹

The UK provisions on machine-generated works exclude the applicability of moral rights. The author of these works is therefore not able to claim the attribution right,⁷⁰ nor the integrity right.⁷¹ It is logical not to award to such "fabricated" authors the right to be identified as what, in reality, they are not. This point arose during the debate preceding the adoption of the [CDPA](#) in 1988; Lord Beaverbrook cast doubts about applying moral rights to computer-generated works, because such rights are concerned with "the personal nature of creative effort",⁷² whereas the person who undertakes the arrangements necessary for the creation of these works "will not himself have made any personal, creative effort".⁷³

Applying s.9(3) CDPA—considering authorship in the context of programmers and users of AI

[Section 9\(3\) CDPA](#) may be helpful to identify authorship, and to award ownership, in scenarios where original works are produced by computers or robots with no or little human input. In *Nova Productions v Mazooma Games*,⁷⁴ the only UK case where [s.9\(3\) CDPA](#) has been applied so far, the court had to determine whether copyright had been infringed in the graphics and frames generated and displayed on a screen by the users when playing a videogame. It was held that such frames were computer-generated works. The programmer was the person who made the arrangements, and therefore the programmer was the author and owner of the copyright. As the Court of Appeal put it,

"the player is not ... an author of any of the artistic works created in the successive frame images. His input is not artistic in nature ... and he has contributed no skill or labour of an artistic kind ... All he has done is to play the game."⁷⁵

Although [s.9\(3\)](#) is certainly useful to courts in making such determinations, its usefulness may decline over time, because with each leap forward AI and machine-learning technologies become more and more autonomous and independent of humans.⁷⁶ Complexities also arise when we consider interactive videogames which offer users the chance to create what would—in another context—be viewed objectively as original works.⁷⁷ The game *Minecraft* is a good example: the aim is to pick up and place 3D objects, such as cubes, arranging them, via personal choices, in a 3D grid. In setting up the boundaries of the game, the programmer has allowed players a significant amount of freedom in choosing how to play, permitting them, e.g., to build entire cities. In these scenarios—as is the case when works are created via AI—it may not be always easy to identify who has made the necessary arrangements for the resulting work to be created; in other words, who puts the program in the position to create the ultimate work? Is this person the machine's programmer? Or is it the user? [Section 9\(3\)](#) may not provide a clear answer. Determining who that person is should rather entail a careful analysis of the facts, circumstances and specific machine application that generated the work. In conjunction with [s.9\(3\)](#) a contextual analysis would therefore be necessary⁷⁸—an approach that would seem to be in line with the 2019 UK Court of Appeal judgment in *Kogan v Martin* on joint authorship (a doctrine we consider below).⁷⁹ The investigation is likely to focus on identifying where the creative elements in the output of the program originated. Who contributed more to the final product—the programmer or the user? What was the quality and nature of the material each of them contributed?⁸⁰ Should ownership be shared on a proportional basis depending on the contributions made e.g. 50/50 or 60/40?

Arguments in favour of the programmer

That a great deal of intellectual effort is required to write computer code is a strong argument in favour of considering the programmers as authors and thus granting them copyright.⁸¹ In this view, the work created by the AI/robot represents the programmer's original intellectual conception because that output can be imagined and generated within the boundaries of the creative space designed by the programmer; and that happens because the programmer is often able to introduce enough constraints and limits on the creative action of both the final user⁸² and the machine itself.⁸³ In other words, the programmer produces the crucial algorithm, and in so doing makes creative choices in selecting the model and preparing the parameter, choosing and apportioning data, determining and double-checking additional steps such as observing and adapting the algorithm after it has become operative.⁸⁴ The programmer could thus be considered the author of the final work(s) created by

the program(s). For this reason, Annemarie Bridy remarks that in the AI context programmers are the “authors of the authors”⁸⁵ because “people-who-write-programs-that-make-art are authors of the art their programs make”.⁸⁶

Proponents of this argument also claim that “users” often merely press a button, sometimes unconsciously, and sometimes even without knowing they are creating a work.⁸⁷ The originality requirement is arguably not met where the person who uses the machine(s) merely pushes a series of buttons and does not employ any kind of skill or intellectual creativity⁸⁸; it is instead the programmer who carries out the more substantial intellectual activity. Awarding copyright to users of the program in scenarios where said users merely press buttons—the argument goes—may encourage people to look for the best programs on the market and then take economic advantage of the final work(s), to which they have not actually contributed anything significant. Furthermore, as a consequence of not receiving copyright in the final outputs of the program, programmers may be discouraged from developing new programs capable of generating music, literature or art. Thus, rewarding the users of the program by offering them legal protection may have the adverse effect of creating—downstream—an incentive for “free riding” and eventually discouraging—upstream—the creation of new cultural products.⁸⁹ It may also push programmers and owners of programs to restrict the dissemination and use of AI technologies, e.g. via contractual terms, which is arguably an unwelcome outcome since it would restrict user freedom.⁹⁰

Arguments in favour of the user

Could the user be conceived in positive terms as the person who made the necessary arrangements under s.9(3) for the creation of the work? Although the programmer or creator of the machine takes upstream decisions as to the purpose for which the program or machine is used, it is the user—one may argue—who eventually triggers the creation of the final output. In this view, programmers merely create a “potential for a creation”⁹¹ and not its actuality.⁹² Programs and machines are, in this sense, viewed as mere tools engineered to be useful for the creation of works by the final users.⁹³

In fact, at times the user is the person who sets the parameters and provides data for the algorithm in ways that significantly influence the final work; and in some circumstances the user may even affect the way the algorithm functions.⁹⁴ Take for example an AI-enabled program capable of producing music, such as Jukedeck, where the user provides relevant inputs that affect the song being created, including selecting the instruments, choosing the musical key or tempo, and selecting a musical style for the composition. The final musical work could be considered the culmination of creative inputs triggered by that user.⁹⁵ That users in such cases have a closer connection with the generation of the ultimate output is reinforced by the fact that the same program, used by different persons, could result in many different sets of outputs, depending on the creative choices made by each user, and regardless of the choices previously made by the programmer.⁹⁶ As the program becomes more sophisticated, the works would get more varied because of the program’s associative elements, with the result that individual compositions triggered by different users would very rarely, if ever, be identical.⁹⁷

A positive of viewing users as authors, and accordingly awarding them rights, is that it would encourage them to obtain and operate the program in order to create new works,⁹⁸ which would put them in the optimal position to bring the final outputs to the market.⁹⁹ This could eventually benefit programmers as well, because users would be incentivised to buy the program and thus increase its overall value.¹⁰⁰ Notably, the market already supplies programmers with the incentive to create the software and machines which are used to produce works—the incentive arising from the prospect of maximising profits owing to sales and licensing¹⁰¹ as well as from copyright (and sometimes patent) protection of the software itself.¹⁰² Awarding copyright to programmers for the outputs as well would therefore be to provide over-protection (or what is known colloquially as “two bites at the apple”¹⁰³ and “double dipping”).¹⁰⁴

Joint authorship?

It is logical to argue that the contributions towards the creation of the final output/work) often come from *both* the programmer of the machine (upstream) and the user (downstream).¹⁰⁵ To use a metaphor from the natural world, under a joint authorship analysis the programmer may be considered as planting the initial “seed” with the user watering it and finally harvesting the creative “fruits”.¹⁰⁶ In other words, the programmer and the user could be seen as co-operating, with the latter adding some creative input and fixing the work under the authority of the former.¹⁰⁷ In one sense the copyright requirements would apparently be satisfied, with both the programmer and the user contributing sufficient originality towards the final work.¹⁰⁸ Judges that are called to determine disputes regarding authorship and ownership of AI-generated works might be willing to follow this line of argument and find that programmers and users are joint authors. Nonetheless, there is a significant problem—it will be difficult to establish a crucial requirement for joint authorship to materialise under UK law (and a similar requirement exists under US law), namely a common intent and design between the programmer and a remote user, two individuals that typically do not meet and often do not even know each other. Under these circumstances the kind of agreement and harmony of interest that is typical of joint authorship scenarios is lacking.¹⁰⁹ Even recent liberal and

“contextual” approaches to joint authorship—such as the UK Court of Appeal decision in *Kogan v Martin*—emphasise the need for a common design. A final complication is that, even if awarded, joint ownership between two remote persons might be difficult to administer in practice, as the copyright would be owned jointly and both authors/owners would need to give consent for e.g. licensing.¹¹⁰

Investors as authors?

Could others be identified as possible candidates for the role of author? What about the (corporate) investor? From an economic perspective, one may argue that the entity or even the individual that has invested financial and human resources in a technology which is capable of creating music, literature or art would reasonably expect some form of return on the investment.¹¹¹ Although an authorship claim may not be strong because the creative act has not been carried out by the investor, an argument could be made about an extension of the “work made for hire doctrine” so as to cover situations where the final work is produced using AI technology promoted by the investor, with the “creative machine” taking the place typically occupied by an employee and the former playing the role of the employer.¹¹² This argument is not particularly convincing, but it cannot be dismissed out of hand.

Machines as authors?

Is the computer, machine or robot a potential candidate for authorship? Certainly, the more independent AI systems become, the harder it is to identify a human being responsible for the arrangements that lead to the generation of the final output higher up the chain. In this view, only the machine can be said to make the key creative choices, understood under the originality doctrine as being based on intellectual creation or skill and labour,¹¹³ because only the machine is involved directly with the production of the work.¹¹⁴ Thus, when the output of a computer contains any “deviations from its input”, the output should be considered as “written” by the computer.¹¹⁵ Any instructions and directions from the (human) programmer and user would be seen as merely the catalyst for the creation of the final work, the final form of which would be “unforeseeable” from the perspective of the human.

As ownership follows authorship, if we consider a machine to be the author of a copyright work, should such a machine also be considered as the owner of the relevant economic rights (leaving aside the ownership of moral rights)? If we take this argument to its logical conclusion, AI and robots would indeed be awarded legal rights. After all—this argument goes—the law recognises that other non-natural “persons”, such as companies, have rights under the law, so it would not be a revolutionary step to provide other non-human entities—i.e. AI/machines/robots—with legal rights.¹¹⁶

This may appear, at first sight, to be a fascinating and imaginative scenario—yet, it is unlikely to materialise, especially with respect to recognising the legal rights of AI/robots.¹¹⁷ The first strong (and obvious) objection is that machines, computers and robots lack legal personhood and therefore are not entitled to claim any legal rights including copyright.¹¹⁸ Giving AI/machines/robots legal rights would require, ex ante, answering complex questions about agency, whether machines should be considered not as mere products but as employees or agents¹¹⁹; and that would necessitate a further assessment of liability issues (in relation to possible violations of rights of others committed by machines). This would be a legal, political and philosophical challenge.¹²⁰ From a practical perspective, it is difficult to imagine a machine being capable of possessing legal standing to claim copyright infringement, or negotiating and signing transfers or licences of its rights to others.¹²¹ Further to this, the analogy with a company’s legal personality is weak, as companies/corporations are vessels for the activities and actions of humans—companies only act through their managers, shareholders, or employees—and this direct connection cannot be easily compared to the choices made by AI.¹²² For this reason, the case for AI to be awarded the rights of the author/owner cannot be supported.

Having considered the issue of artificial intelligence as creative producer, we next consider how AI consumes and makes use of existing copyright works and data in order to learn and create new works. What are the consequences of this for copyright?

Artificial intelligence as consumer

Creative machines consume. They often devour huge amounts of data as part of learning processes including books, photographs, images, articles, social media feeds, videos, and other kinds of content. Data are the building blocks of algorithmic creativity.¹²³

Programs that generate music, for example, are fed with huge quantities of source material, from hits at the top of the chart to lesser-known pieces, which they assess with a view to finding patterns. Programs process elements such as length, tempo and chords, and how musical notes relate to one another, learning from all the input that has been fed into the machine so that

they can compose new melodies.¹²⁴ A similar process occurs in the case of AI-generated figurative art. The Next Rembrandt artwork was created after the machine had been fed with high-quality scanned images of 350 paintings by the Dutch maestro; meanwhile, over 150 gigabytes of digital graphics were used to give the machine instructions to come up with the textures and layers necessary to have the style of a Rembrandt painting.¹²⁵ The final artwork received mixed reviews from critics, dismissed by one as “fan-fiction”—though it is worth noting that even fan-fiction can have an artistic and monetary value.¹²⁶

What is crucial is that AI systems learn by accessing and analysing *pre-existing* works and data in order to produce the final work. From a copyright perspective this raises an issue: among such pre-existing outputs which are accessed and analysed by AI machines there are often works protected by copyright that are owned by third parties. What are the consequences of this from a legal perspective?

Copyright infringement risks

Issues of copyright infringement inevitably arise in this context, as vast numbers of copyright works fall within the net of these creative machines; indeed, infringement may occur in relation to both the *inputs to* and *outputs of* AI.¹²⁷ As far as the former is concerned, the risk is that a violation of the reproduction right may materialise—machines need to reproduce the data they access during the learning process. As to the latter, final outputs may be considered an adaptation of the works that are assessed by the machine.¹²⁸ Since algorithmic creativity has evolved to the point where it can interpret authors’ and artists’ styles in digital forms, basing the new works on the existing universe of works previously produced by such authors and artists, the infringement analysis here will be dependent on the possibility of recognising in the final product the features of the works used in the training process. If the original upstream work has been so changed and transformed that only marginal similarities remain in the machine-created output, no infringement would take place. On the other hand, should the final product generated by the robot include identifiable and non-secondary elements of an original work, an infringement of the adaptation right is likely to materialise.¹²⁹

Infringement analysis may turn out to be complicated in practice; for example, US law requires the copyright owner to prove that the defendant has had access to the copyright work before reproducing and adapting it. In particular, when it comes to AI creative machines, malicious and bad faith behaviours may occur to try to “disprove” such access, with, e.g., the programmer being tempted to remove a work (a song or a video) from the master list, thereby erasing it from the computer’s memory.¹³⁰

The fair use debate under US law—distinguishing non-expressive from expressive uses

As AI and machine learning’s creative abilities are based on the upstream collection and analysis of data, it is important to determine when the use of such information by the computer can be considered as fair use under US law. Accurate fair use analysis should be based on the distinction between expressive and non-expressive use of copyright material; while the former may not be exempted from copyright infringement, the latter is often deemed sufficient to escape liability.¹³¹ Existing US case law involving technology companies may help to explain this distinction and could be applied *mutatis mutandis* to AI scenarios. Two relevant cases are *Kelly v Arriba*¹³² and *Perfect10 v Amazon*.¹³³ In both cases the defendants provided image search engine services. The plaintiffs (claimants) in *Kelly* and *Perfect10* owned copyright covering certain images that had been reproduced in thumbnail form, stored on defendants’ servers, and shown to internet users who used Arriba and Amazon services. The courts held that the defendant’s activities were transformative fair uses—and considered the image search engines managed by the defendants as simple tools. The courts found that they were not vehicles used to convey expression, and the use of the copyright material by Arriba and Amazon was merely instrumental, lacking any artistic or aesthetic purpose.¹³⁴

US courts made similar rulings in two other cases, namely *Authors Guild v Google*¹³⁵ and *A.V. ex rel. Vanderhye v iParadigms*.¹³⁶ The first dispute focused on the Google Books Library Project, which consists of scanning and making searchable the book collections of major research libraries. The court found that making copies when the aim is to allow the easy search and identification of books that contain a term of interest is transformative and therefore fair. Such a service—the court added—does not displace or substitute for books because it is not an instrument that people use to read the books—it just facilitates their search. The second case focused on the plagiarism detection service Turnitin (the program consists of checking the submitted documents against its database of papers and material). Again, no copyright infringement was found by the judge because the use of digital copies of copyright works by the program was considered totally unrelated to expressive content, transformative, and therefore incapable of producing a market substitute.¹³⁷ More precisely, the court held that Turnitin does not use the papers for their creative meaning, and even though it stores the whole document, it does not publish a full copy of it for other people to access and see it.

This bolsters the argument that certain non-expressive and non-creative uses of copyright works by AI machines would also

constitute fair use under US law. Take for example datasets used to train facial recognition AI (such technology is able to recognise a person from a digital image). Although training a facial recognition machine often entails copying large quantities of copyright-protected pictures, what is being used by the program does not relate to the creative and expressive choices made by the photographers—such use focuses instead on matching facts about people’s identity with facts about their physical resemblance.¹³⁸ This is arguably fair use. Similarly, imagine a caretaker robot which accompanies its blind owner to a museum, with the robot taking pictures of the walls to read the exhibits and bringing the blind owner to the artworks she prefers (or even taking pictures of the sculptures that may represent obstacles in her path).¹³⁹ Again, here the copyright works (paintings and sculptures) are reproduced just for the purposes of pattern recognition, which makes the use non-expressive and therefore fair.

A different scenario would occur where copyright works are used to train algorithms for developing new creations. The use of the source material could be considered expressive. With *The Next Rembrandt* artwork the machine was “imbued” with all the paintings created by the Dutch artist for training purposes so as to be able to generate a work of art in the style of Rembrandt. Another example is the *Portrait of Edmond Belamy*, an AI-produced artwork sold by auction house Christie’s in October 2018 for US\$432,500¹⁴⁰ —the work was generated after the machine was fed with a dataset of 15,000 portraits painted between 1300 and the 20th century. The use of the source material in both cases was not merely mechanical and instrumental—it was instead expressive because it aimed at producing a creative output.

One may thus argue that expressive uses of copyright works by AI systems should not be exempt from copyright infringement via the fair use defence, especially if the final output is going to be exploited commercially and not, for example, used for research purposes.¹⁴¹ These uses are indeed likely to affect the markets where the copyright owner is active.¹⁴² In particular, authors and artists whose works are analysed and used as source material and in training exercises may be deprived of markets they exploit.¹⁴³

Issues of fairness and balance between rights and obligations should also be taken into account. If programmers, owners or users of AI systems want to claim exclusive rights over the final outputs generated by their machines, they should also accept responsibility for those works, in relation not only to copyright infringement, but also, for instance, to libel or any other source of liability.¹⁴⁴ This point makes sense: if you are the one who claims to be an “author/owner” as a result of the generative process carried out by the AI system, you should also be liable for when the computer infringes the rights of others.¹⁴⁵

Giving algorithmic creativity a generous fair use treatment, allowing machines to access and use freely existing copyright material for training purposes, may not produce a positive outcome. Why should the programmer, owner or user of AI which consumes huge quantities of copyright works for creative purposes be exempt from asking for authorisation for this, while a human creator doing the same on a much lower scale cannot take advantage of such exemption?¹⁴⁶ What should be avoided is a binary copyright regime that discriminates between human creators who access, analyse and use pre-existing copyright works, and AI which does the same but at a higher speed and with a much wider reach.¹⁴⁷ Terminology may also help explain the risk of a double-standard copyright system. When human beings access and use pre-existing source material, we refer to “works”. When the same is done by learning machines, the preferred term is the much more apparently neutral “data”.¹⁴⁸

There is also a “human displacement” argument. If using copyright source material as input data for AI machines becomes rampant and unlimited, some portions of the creative industries market may become totally automated.¹⁴⁹ In other words, if copyright regimes treat machines more favourably than they treat humans (e.g. by giving them an easier access to the fair use harbour) in the long run human beings might be disadvantaged and prevented from competing with AI creators, which could reduce human creative efforts. AI could become so adept at creating music, art, movies and literature without the need of clearing rights as to eventually become capable of superseding human ingenuity. Would such a scenario be welcomed by humans? The answer is certainly “no”.¹⁵⁰

A stronger argument could be made in favour of a relaxed fair use regime for AI—aimed at avoiding biases during the algorithmic creative processes. How can biases occur? Most 20th-century and early 21st-century works are protected by copyright and therefore cannot be reproduced and adapted without permission, a fact which may limit the analysis of data by AI technologies. Amanda Levendowski argues that copyright law restricts access to and use of training data to works in the public domain, which may contribute to biased AI.¹⁵¹ Most extant public domain material was created at, or before, the beginning of the 20th century, when the dominant narrative in the arts and literature was “wealthier, whiter, and more Western than it is today”.¹⁵² A dataset consisting solely of such public domain source material would inevitably ignore voices that had not been made public before the early 20th century, including those of women, people of colour or members of the LGBTQI+ communities.¹⁵³ On the other hand, if under the fair use doctrine AI can access, reproduce and analyse all copyright material, the range of pre-existing works that could shape and influence the final (machine-generated) outputs

would be more recent, modern, diversity-cognisant, tolerant and thus less biased. Under these circumstances AI systems not only would be able to use any kind of work to train their algorithms—they could also make public the kind of material that has been fed into the system without being afraid of copyright objections.¹⁵⁴ Therefore using copyright works as training data is important to minimise the risk of imbuing AI with biases that perpetuate old fashioned attitudes, behaviours and social norms. Seen from this perspective, extending fair use to AI systems—especially in relation to expressive uses of copyright source material—would promote fairer algorithmic systems that may contribute to mitigating biases and making society more tolerant.¹⁵⁵

Yet, it remains to be seen how an extension of such doctrine to computational creativity to allow access to huge quantities of copyright material can be reconciled with the need to avoid a binary copyright system which treats algorithmic ingenuity more favourably than human genius and may eventually constitute a threat to the latter.

Exempting AI uses of copyright material under EU law and UK fair dealing

What about Europe? Given there is no direct equivalent of US transformative use under UK fair dealing, it is necessary to consider the issue through the prism of the narrow exceptions provided under EU law. The key EU copyright rule that could exempt certain mechanical and non-expressive uses of copyright works by AI machines—especially, the reproduction of input source material fed into the system—is the transient copy exception under the [Information Society Directive](#).¹⁵⁶ This provision—which remains applicable in the UK, Brexit notwithstanding—exempts temporary acts of reproduction provided that they are transient or incidental, an essential part of a technological process, enable the lawful use of a work and have no independent significance. It allows the reproduction of a copyright work if the copy is necessary to carry out technological and mechanical tasks of no autonomous value—with the classic example being the temporary copy of a webpage stored in the browser’s cache. This exception could potentially cover AI scenarios.¹⁵⁷

Consider the example of a machine searching for online information on weather forecasts to schedule free days for customers, with extracts of such information being stored in the machine as transient or incidental copies just for the purpose of transmitting a work across a network between third parties.¹⁵⁸ Reproducing the works seems here essential to the training process—and the copies need not be kept in the system after running through the neural network. This use of copyright material is non-expressive and will likely be considered legal under EU copyright law (as well as in UK law and in the laws of most EU Member States).¹⁵⁹ As copyright owners in such circumstances do not suffer economic harm, the use of the protected works is likely to pass the “three-step test” under the [Information Society Directive](#), which states that any exception under this piece of legislation, including the transient copy exception, “shall only be applied in certain special cases which do not conflict with a normal exploitation of the work or other subject-matter and do not unreasonably prejudice the legitimate interests of the rightholder”.¹⁶⁰ Furthermore, in the case of *Football Association Premier League v QC*,¹⁶¹ the CJEU highlighted the need to strike a fair balance between the interests of copyright owners and the users of protected works who would benefit from copy-reliant technologies.

There is another exception in EU copyright law that may be relevant in these scenarios. It is the text and data mining exception to the reproduction right introduced by the [2019 EU Directive on Copyright in the Digital Single Market](#) (at time of writing the UK Government has indicated it will not bring this into UK law).¹⁶² Could uses of copyright material fed into the AI platform be excluded under this provision? Text- and data-mining activity allows the extraction and use of significant amounts of digitally available information,¹⁶³ e.g. to discover scientific research opportunities in corporate documents, social media feeds, medical records, academic articles and other sources of text-based data.

This is potentially useful to AI creative platforms that are fed with vast quantities of data. Yet, the exception under the EU Directive is limited. First, the text- and data-mining activity can be carried out freely only by research organisations and cultural heritage institutions for the purposes of scientific research.¹⁶⁴ This provision may push AI companies that engage in text and data mining to opt for public-private partnerships with public research centres¹⁶⁵; but any commercial exploitation of the final work created by the machine after being fed with the copyright material is likely to be limited, if not excluded entirely.¹⁶⁶ Another provision of the Directive appears in principle to allow text- and data-mining activities by business and for-profit entities, and for any purpose (for example for the reproduction of copyright material).¹⁶⁷ Yet, such an exception does not apply if copyright owners have reserved the right to mine—which means that the exception can be easily overridden by the copyright owners’ indication that they do not want to allow such activity.¹⁶⁸

The limitations to the text and data mining exception under EU law significantly restrict the opportunities for AI business-oriented organisations to carry out such activities in the context of machine learning platforms—and this is true in relation to both expressive uses of prior copyright works for creative purposes (which can be hailed as a positive outcome in light of the arguments developed earlier in this part) and non-expressive and merely mechanical uses of such material (which

can be considered instead a negative outcome taking into account that such uses have less chance of prejudicing the interests of copyright owners). On the other hand, research centres, heritage institutions and other similar entities that use AI for non-profit purposes will be free to engage in text and data mining activity. It remains to be seen if (in addition to merely mechanical uses of pre-existing copyright works) non-profit organisations can also engage under this exception with respect to expressive and creative AI uses of the mined data; a clarification by some EU Member States' national courts or even the CJEU on this issue may be required. Having considered the issue of AI as consumer, we now return to the question of how to deal with the production of new works by AI.

Evaluating the public domain and sui generis right as solutions

Having outlined the various problems with awarding ownership to the programmer or user (separately or jointly) or to the AI/machine itself, we turn now to alternative proposals that may provide a solution to the question of whether and how the results of algorithmic creativity should be legally protected.

The public domain solution

A tempting option could be to deem the works created by machines as automatically entering the public domain. As there is no human author directly involved in the creative production of the output, we could argue that no one should be able to claim exclusive rights over it.¹⁶⁹ Works produced by robots would thus be comparable to things found in nature, such as music that the wind generates when it moves through wind chimes, or the sounds of a waterfall, or birds singing at dawn¹⁷⁰—outputs which cannot be monopolised by anyone.¹⁷¹ There is also an (obvious) incentive-related argument that supports this position. Machines are not able to respond to the incentives/rewards offered by copyright—and therefore their works should remain in the public domain (at least until technology evolves deeply so as to give machines some sort of human-like consciousness, but for now we can eliminate this possibility).¹⁷²

This solution would also neutralise the anti-competitive risks that an over-proliferation of strong and long-lasting exclusive rights protecting AI produced output, owned by corporate entities, may bring. Seven commercial companies working with AI technologies—Apple, Google, Microsoft, IBM, DeepMind, Facebook and Baidu—already dominate this lucrative market.¹⁷³ The scenario would turn even more anti-competitive if a US-style work-made-for-hire approach were used in relation to these works, with the programmer/employer considered the author and thus copyright owner; the same would be likely to result if the UK s.9(3) approach were used. There is little doubt that AI companies would be attracted by the idea of securing ownership of exclusive rights in such works—it might even encourage them to hoard their AI technologies, so as to always remain the “employers” and therefore the right holders. This would consolidate the dominant position of a few tech companies.¹⁷⁴

The public domain option is not just a theoretical proposal—it is already operative in jurisdictions such as the US, which (as we have discussed earlier) do not explicitly protect, via copyright, works generated by machines.¹⁷⁵ Australian copyright law does not consider such works protectable either.¹⁷⁶ In these jurisdictions public domain seems the default position. Several scholars support this approach.¹⁷⁷

Is this solution desirable? Would the refusal to offer works generated via algorithmic creativity legal protection discourage investments in, and dissemination of, the underlying AI technologies? Given that the law of copyright (and in some cases, patents) is already available for protecting the underlying programs themselves, even if not the outputs, it is plausible that a sufficient incentive already exists. On the other hand, without the lure of the exclusive rights offered by copyright, we cannot rule out that the incentives to develop and make available AI machines capable of creating musical, literary or artistic outputs could be lessened.¹⁷⁸ As this argument goes, denying legal protection of machine-generated outputs may not have the effect of increasing the public domain in the long term; it could instead reduce the incentives to create new AI works, and may ultimately lead to a lower number of these outputs being produced, and accordingly, a decrease in works that would eventually enter the public domain. In this view, the arts, education and technology sectors may not see sufficient investments into research on AI applications.¹⁷⁹

There is a good reason to be sceptical of such arguments—after all, property rights are not the only incentives to create. Investment in AI platforms can be encouraged by factors other than the availability of copyright. Academic and industry respect and recognition, commercial gains through sales of AI programs to other users, and, of course, the human desire and passion to create would still be present—providing AI developers and organisations with incentives to come up with AI technologies.¹⁸⁰ Moreover, in the digital market, high demand for instantly consumable media produces a significant first-to-market motivation that materialises independently of copyright being available.¹⁸¹ Furthermore, as mentioned earlier, the software code which is incorporated in the machine may itself be protected by copyright law (or patent law in some

cases),¹⁸² with trade secrets and copyright protection of databases consulted by the program also being potentially useful.¹⁸³

Nonetheless, there is a genuine concern that if copyright jurists decide that AI works should not be protected, and should instead reside in the public domain—this could encourage (human) dishonesty. Human authors who have used AI technologies to create works may be wary of revealing this for fear that to do so would make the resulting works unprotectable. Surely, the law should not encourage dishonesty?

This not a hypothetical problem. Robert Plotkin narrates how a team of computer scientists and musicians from University College London developed a music composition machine that composed music based on an automated assessment of Top 10 tracks; yet, the role of the machine was kept confidential as the music label that invested in the project did not want to disclose that its songs had in fact been written by a machine and not by human musicians. The label was so keen in keeping the involvement of the machine confidential that it even staged meetings with human composers, allowing them to act as copyright holders, receiving royalties.¹⁸⁴ An increase in dishonest practices seems inevitable if AI works remain unprotectable. Further to this, there is no doubt that corporate entities will argue in favour of (at the judicial level) and lobby for (at the legislative level) some form of exclusive rights over AI-produced outputs. For this reason, it is worth evaluating whether rather than giving full protection to such works, there may be a justification for awarding a more limited type of protection.

A sui generis right for works created via algorithmic creativity?

We have seen that at present copyright regimes may not be fit to accommodate what is produced by algorithmic creativity; indeed, copyright laws in several jurisdictions do not explicitly protect machine created works. The lack of human authorship/originality is a key factor in this regard. Yet, whether we agree or not, it is inevitable that corporate entities will lobby for a form of exclusive rights to protect the final outputs of machine-driven processes. Could an acceptable compromise be offered by a sui generis system—a kind of protection that could incentivise the development of and use of AI creative platforms while at the same time safeguarding human ingenuity?¹⁸⁵ The benefit of a sui generis regime (as opposed to using the full scope of copyright to protect such works) would be that right holders could be given only a thin scope of protection, allowing them to prevent others from exploiting exact copies of the machine-generated work. In this view, it would essentially be protection against literal copying only.¹⁸⁶ As to the length of protection, unlike the typical copyright duration, a very short duration could be applied in the AI context e.g. three years from the date of publication of the work (the length of term suggested in a recent AIPPI “Study Question” by Dutch delegates).¹⁸⁷

Why should a thinner and shorter right be preferred?¹⁸⁸ The usual justifications for the long duration in the context of human authors would not apply. In fact, providing AI developers and companies incentives for AI-created works by offering the strong traditional copyright protection/duration may even lead to fewer human-generated works being created in the long run.¹⁸⁹ AI creative capacity is potentially both more vast and speedier than human capacity.¹⁹⁰ The risk is a devaluation of human intellectual ingenuity and a marginalisation of the human creative potential.¹⁹¹ Just as automation threatens (and, over time, eliminates) existing jobs in manufacturing, AI creativity could threaten the value of human authorship.

The provision of a limited sui generis right might neutralise this risk by providing an incentive to recognise the creativity of AI works without giving machines an equal level of protection to humans.¹⁹² The fact that only literal copying would be prohibited would leave human creators free to adapt, transform and reinterpret AI-generated works and thus to use them for creative purposes. In fact, such a feature of the proposed sui generis right may fit with the characteristics of many AI machines such as Amper, an AI music composition system.¹⁹³

With regard to AI consumption, the thin sui generis right may be coupled with interpreting the relevant fair use (US) or fair dealing (UK) rules governing the internal processes of algorithmic creation in line with what we discussed earlier in this article.¹⁹⁴ Overall it is arguable that the introduction of a thin and time-limited right could achieve an appropriate balance: while some incentives would still be given to the developers of AI creative technologies via the offer of exclusive rights aimed at preventing the exploitation of the final output by third parties, the reduced scope and duration of the protection will leave human creators with enough freedom and motivation to create. Such a balance would preserve value in human ingenuity (fully protectable by copyright) and at the same time sufficiently protect machine produced outputs (and thus encourage investments in and use of AI technologies).¹⁹⁵

What would the requirement for attracting the sui generis protection be? An originality test as assessed and interpreted objectively and contextually would be appropriate.¹⁹⁶ As discussed earlier, judges could consider the work’s aesthetic, literary or artistic similarity to existing works when considering originality, in the sense of being sufficiently distinguishable from prior works. While this would necessarily differentiate the originality standards between human created works and AI works,

it is worth noting that the requirements for attracting protection can vary even under existing laws. Under UK law, for example, while graphic works, photographs, sculptures and collages attract copyright based on originality “irrespective of artistic quality”, other fruits of human creativity like works of artistic craftsmanship are protected only if they reach a certain threshold.¹⁹⁷

Who would the owner of such a sui generis right be? The UK AIPPI Group identifies two possible approaches, i.e. the *proximity* and the *investment* approaches.¹⁹⁸ By using the proximity criterion, the owner could be: (i) the natural or legal person that is most closely associated with the creative output—for example the person who comes up with the code (coder); or (ii) the person who identifies the objective to be reached (goal selector); or (iii) the person who chooses the input data (data selector); or (iv) the person who trains the AI (trainer); or (v) the person who carries out a qualitative or aesthetic selection of a work from a number of new artificially generated works (output selector).¹⁹⁹ Unsurprisingly, the UK Group of AIPPI favours the *investment* approach on the basis of legal certainty, thus clearly arguing for corporate ownership, i.e. that the natural or legal person who invests in the project should be considered the owner of the sui generis right.²⁰⁰

EU law supports this. The [EU Info-Society Directive](#) in [Recital 5](#) recognises that

”[t]echnological development has multiplied and diversified the vectors for creation, production and exploitation. While no new concepts for the protection of intellectual property are needed, the current law on copyright and *related rights* should be adapted and supplemented to respond adequately to economic realities.” (emphasis added)

[Recital 5](#) mentions “related rights” as referring to rights protecting outputs such as cinematographic works, sound recordings and broadcasts. A sui generis right protecting AI-created works might fit well into the “related right” category of rights that aims at incentivising investments in crucially relevant technological fields.²⁰¹

There are of course arguments that caution against the introduction of a sui generis system. Creating sui generis laws to accommodate the needs of a certain sector or industry fails to keep copyright regimes technology-neutral.²⁰² Yet, it could be counter-argued that copyright laws bring with them the seed of “differentiation”. These laws have produced across the decades different rules in relation to different works. For example, the range of copyright works are quite distinct from each other, from literary, artistic and musical works to more entrepreneurial (and investment-driven) kinds of subject matter including typographical arrangements of published editions, original compilations of data, sound recordings and broadcasts.

Perhaps the greatest concern with the enactment of a new right would be the danger of increased corporate ownership. This is undoubtedly a worry. However, the recent Shenzhen case demonstrates that in the absence of a thin sui generis right, corporate entities will attempt to claim the full rights of copyright over AI created works. Thus, even if there are risks attached to a sui generis system, if it is enacted in a balanced way the risk of consolidating monopolistic rent-seeking power may be significantly reduced, if not completely ruled out.

Conclusion

It is true that there is a person “behind every robot”²⁰³ because machines are created, programmed and directed by human beings. Yet, there is also little doubt that nowadays art, music, literature and movies, among other outputs, are being generated semi-autonomously by machines without relevant human choices being made over the final works. As the technology progresses further, the direct role of human beings in algorithmic creativity is likely to become more and more distant. Awarding copyright ownership to such humans seems less justifiable the more remote the human intervention becomes.

At the same time, we acknowledge that machines should not be considered authors/owners in their own right; aside from the complexities of agency that arise if authorial rights are given to non-humans, the simple fact is that machines need no incentives/rewards to create.²⁰⁴ Computers produce works for one reason—they are devised and programmed to execute certain functions and trained to do so accurately.²⁰⁵ Machines do not get tired, do not crave maximum hour or minimum wage protection, and can concentrate incessantly on their tasks, no matter how complicated or tedious.²⁰⁶ What it takes to make these machines work is just electricity,²⁰⁷ wires, various electronic devices and an internet connection.²⁰⁸

Nonetheless, as the kinds of works produced by AI increasingly resemble works traditionally made by humans, there will inevitably be claims by corporate actors that the machine-generated outputs should be considered protected by copyright (and owned by corporate actors). We caution against this development, while also acknowledging it may be inevitable that some form of protection is required. Even scholars that are sceptical about extending copyright to AI produced outputs believe that if a machine is capable—for example—of writing fiction that is interesting enough to capture audiences willing to pay, it

would be logical for the programmer, owner or user of such a machine to attempt to protect such value, not only via technological measures or contractual provisions, but also through copyright law.²⁰⁹ Indeed, it would be odd if these works were left unprotected (and in the public domain), as this would bring about an absurd result: a very simple and banal stick man sketched by a human hand in just a few seconds would be more worthy of protection than a sophisticated machine-created painting such as the *Next Rembrandt* or the *Portrait of Edmond Belamy*.²¹⁰

So, what kind of protection should be offered to the fruits of algorithmic creativity? We have demonstrated that copyright regimes—for example in the UK, US, Australia and under EU law—might not be the best fit. Indeed, considering AI-generated output as copyright may require overstressing and rethinking important rules and principles, such as the authorship and originality requirement, which are at the core of copyright systems and are still anchored to romantic views focused on the centrality of the human author. The traditional copyright system may not be adequate for another reason: the long duration awarded to works of human authorship.

A sui generis right might therefore be an acceptable solution, i.e. a system that could strike a fair balance between the need to encourage the creation of these technologies (through the offer of exclusive rights) and the need to guarantee that human-made creativity continues to thrive despite machines' competition. The scope of protection given by the sui generis right should be thin, and backed up by a strict fair use/fair dealing doctrine, and its duration would be very short (e.g. three years).

Lastly, there is no doubt that protecting AI-generated works will shift the focus from the subjective element of traditional creative processes (the centrality of the human author) to the objective outputs produced by machines, thus changing the emphasis from *authors* to *works*.²¹¹

Footnotes

- ¹ Hereinafter in the context of this article we will use interchangeably the terms “AI”, “machine”, “robot”, “computer”, “program” and “algorithm” when referring to technologies capable of producing outputs without substantial human involvement.
- ² Emma Featherstone, “Introducing the next generation of music makers” (29 August 2017), *The Guardian*, <https://www.theguardian.com/small-business-network/2017/aug/29/computer-write-music-jukedek-artificial-intelligence> [Accessed 18 March 2020].
- ³ Featherstone, “Introducing the next generation of music makers” (29 August 2017), *The Guardian*, <https://www.theguardian.com/small-business-network/2017/aug/29/computer-write-music-jukedek-artificial-intelligence> [Accessed 18 March 2020].
- ⁴ See AIVA’s website at <http://www.aiva.ai> [Accessed 18 March 2020].
- ⁵ Bartu Kaleagasi, “A New AI Can Write Music as Well as a Human Composer – The future of art hangs in the balance” (9 March 2017), <http://www.futurism.com/a-new-ai-can-write-music-as-well-as-a-human-composer> [Accessed 18 March 2020].
- ⁶ Technologies that are capable of composing music can also be patented inventions. One such example is international patent WO/2008/077128, owned by David Cope, protecting an invention entitled “Recombinant music composition algorithm and method of using the same”. The abstract of the invention tells us that: “The present invention provides a retrograde recombinant composition algorithm that creates new musical compositions based on existing musical compositions that are preferably written in software and is suitable for implementation in electro-mechanical and electronic devices that generate musical works based on existing bodies of music. The retrograde approach to recomposition according to the present invention provides a highly simplified code that executes at a high speed, and accordingly a reduced need for computational resources.” See the WIPO webpage at <https://patentscope.wipo.int/search/en/detail.jsf?docId=WO2008077128> [Accessed 18 March 2020].

Selmer Bringsjord and David Ferrucci, Artificial Intelligence and Literary Creativity: Inside the Mind of BRUTUS, a Storytelling Machine (Hillsdale NJ: Lawrence Erlbaum Associates, 2000).

See the webpage http://www.kurzweilcyberart.com/poetry/rkcp_poetry_samples.php [Accessed 18 March 2020].

See US patent No.6,647,395: “A method of generating a poet personality including reading poems, each of the poems containing text, generating analysis models, each of the analysis models representing one of poems and storing the analysis models in a personality data structure. The personality data structure further includes weights, each of the weights associated with each of the analysis models. The weights include integer values.”

See the webpage <https://automatedinsights.com> [Accessed 18 March 2020].

See the webpage <https://narrativescience.com> [Accessed 18 March 2020].

Harold Cohen, “The further exploits of AARON, Painter” (22 July 1995), <https://web.stanford.edu/group/SHR/4-2/text/cohen.html> [Accessed 18 March 2020].

Alex Rayner, “Can Google’s Deep Dream become an art machine?” (28 March 2016), The Guardian, <https://www.theguardian.com/artanddesign/2016/mar/28/google-deep-dream-art> [Accessed 18 March 2020].

Chris Baraniuk, “Computer Paints ‘New Rembrandt’ after Old Works Analysis” (6 April 2016), available at <https://www.bbc.com/news/technology-35977315> [Accessed 18 March 2020].

This is the case of Ai-Da, “the world’s first ultra-realistic AI humanoid robot artist”, who had her first solo exhibition of eight drawings, 20 paintings, four sculptures and two video works in Oxford in June 2019: see *Matthew Stock, “Ai-Da, The Humanoid Robot Artist Gears up for First Solo Exhibition” (5 June 2019),* <https://www.reuters.com/article/us-tech-robot-artist/ai-da-the-humanoid-robot-artist-gears-up-for-first-solo-exhibition-idUSKCN1T6215> [Accessed 18 March 2020].

See the \$432,500 sale by the auction house Christie’s in October 2018 of the AI-created portrait in a gilt frame *Portrait of Edmond Belamy* (see Christie’s webpage at <https://www.christies.com/features/A-collaboration-between-two-artists-one-human-one-a-machine-9332-1.aspx> [Accessed 18 March 2020]).

Jared Vasconcellos Grubow, “O.K. Computer: The Devolution of Human Creativity and Granting Musical Copyrights to Artificially Intelligent Joint Authors” (2018) 40 *Cardozo Law Review* 409 (noting, with specific reference to music, that “AI learns the notes, rhythms, and other musical elements of each work, it assigns weights to them until it can accurately predict subsequent notes and rhythms within a genre. Each note output is a subsequent input for generating a musical phrase. The weights, linked to specific neurons and layers of the neural network, resemble human emotions when we hear music we like – chemical interaction between two neurons fire, triggering the release of pleasant-feeling hormones. It is algorithmic emotion”).

Pamela Samuelson, “Allocating Ownership Rights in Computer-Generated Works” (1985–86) 47 *U. Pitt. L. Rev.* 1208; Daniel Gervais, “The Machine as Author” (2019) 105 *Iowa Law Review* 1.

Martin Kretschmer and Friedemann Kowohl, “The History and Philosophy of Copyright” in Simon Frith and Lee Marshall (eds), Music and Copyright (Edinburgh: Edinburgh University Press 2004), pp.21–53. See also Anne Barron, “Kant, Copyright and Communicative Freedom” (2012) 31 *Law and Philosophy* 1.

Annemarie Bridy, “Coding Creativity: Copyright and the Artificially Intelligent Author” (2012) *Stanford Technology Law Review* 1 (noting that “the copyright system is now in a digitally induced crisis”).

Shlomit Yanisky-Ravid, “Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era – The Human-Like Authors are Already Here – A New Model” (2017) *Mich. St. Law Review*

659, 670 and 675.

22

It has been argued that the fact that AI creative processes are based on randomness and unpredictability should not be considered as a bar to copyright. Indeed, such features are also shared by creative processes unleashed by human beings: see Samantha Fink Hedrick, “I Think, Therefore I Create: Claiming Copyright in the Outputs of Algorithms” (2019) 8 NYU J. Intell. Prop. & Ent. L. 324, 365 (also noting that “had randomness or unpredictability been a bar to creativity, Jackson Pollock would have been unable to claim copyright in any of his works, as he could not have known precisely where each drop of paint would fall on the canvas, or the shape that every splatter would take upon contact. To claim copyright, control over a work must be sufficient, but not complete”). In the same article (p.343) Hedrick also argued that knowledge of the intricacies of deep learning is not conclusive, as a programmer can still maintain control even without a complete understanding of its operations, in the very same way a young and inexperienced photographer who chooses a setting on her camera, without understanding what it does or how it works, will still be able to use those settings to manipulate the output; see also Grubow, “O.K. Computer” (2018) 40 Cardozo Law Review 409 (noting, with specific reference to music, that the unpredictability of the final output “serves as a proxy for creativity”).

23

US Copyright Office, 68th Annual Report of the Register of Copyrights (1965), p.5.

24

National Commission on New Technological Uses of Copyrighted Works (CONTU Commission) – Final Report (1978), p.44; see also Ithiel De Sola Pool, “The Culture of Electronic Print” (1982) 111 Daedalus 29 (noting that “the idea that a machine is capable of intellectual labor is beyond the scope of the copyright statute”).

25

US Office of Technology Assessment, “Intellectual Property Rights in an Age of Electronics and Information” (1986), p.69.

26

US Office of Technology Assessment, “Intellectual Property Rights in an Age of Electronics and Information” (1986), p.69. See also Yanisky-Ravid, “Generating Rembrandt” [2017] Mich. St. Law Review 659, 662–663.

27

Darin Glasser, “Copyrights in Computer-Generated Works: Whom, If Anyone, Do We Reward?” (2001) 1 Duke L. & Tech. Rev. 24; Charles Cronin, “Virtual Music Scores, Copyright and the Promotion of a Marginalized Technology” (2004) 28 Colum. J.L. & Arts 1; William Ralston, “Copyright in Computer-Composed Music: HAL Meets Handel” (2005) 52 J. Copyright Soc’y U.S.A. 281; Mark Perry and Thomas Margoni, “From Music Tracks to Google Maps: Who Owns Computer-Generated Works?” (2010) 26 C.L.S.R. 621; Jani McCutcheon, “The Vanishing Author in Computer-Generated Works: A Critical Analysis of Recent Australian Case Law” (2013) 36 Melbourne University Law Review 915; Emily Dorotheou, “Reap the Benefits and Avoid the Legal Uncertainty: Who Owns the Creations of Artificial Intelligence?” (2015) 21 C.T.L.R. 85; Burkhard Schafer, Davis Komuves, Jesus Niebla Zatarain and Laurence Diver, “A Fourth Law of Robotics? Copyright and the Law and Ethics of Machine Co-Production” (2015) 23 Artificial Intelligence and Law 217; Robert C. Denicola, “Ex Machina: Copyright Protection for Computer-Generated Works” (2016) 69 Rutgers L. Rev. 251; Madeleine de Cock Buning, “Autonomous Intelligent Systems as Creative Agents under the EU framework for Intellectual Property” (2016) 7 European Journal of Risk Regulation 310; James Grimmelman, “There’s No Such Thing as a Computer-Authored Work” (2016) 39 Colum. J. L. & Arts 377; Annemarie Bridy, “The Evolution of Authorship: Work Made by Code” (2016) 39 Colum. J.L. & Arts 395; Bruce Boyden, “Emergent Works” (2016) 39 Colum. J.L. & Arts 377; Ryan Abbott, “Artificial intelligence, Big Data and Intellectual Property: Protecting Computer-Generated Works in the United Kingdom” in Tanya Aplin (ed.), *Research Handbook on Intellectual Property and Digital Technologies* (Cheltenham: Edward Elgar, 2017); Ana Ramalho, “Will Robots Rule the (Artistic) World? A Proposed Model for the Legal Status of Creations by Artificial Intelligence Systems” (2017) 21 Journal of Internet Law 12; Benjamin Sobel, “Artificial Intelligence’s Fair Use Crisis” (2017) 41 Colum. J.L. & Arts 45; Kalin Hristov, “Artificial Intelligence and the Copyright Dilemma” (2016) 57 IDEA: The IP Law Review 431; Robert Yu, “The Machine Author: What Level of Copyright Protection Is Appropriate for Fully Independent Computer-Generated Works?” (2017) 165 U. Pa. L. Rev. 1245; Andres Guadamuz, “Do Androids Dream of Electric Copyright? Comparative Analysis of Originality in Artificial Intelligence Generated Works” [2017] I.P.Q. 169; Amir Khoury, “Intellectual Property Rights for Hubots: On the Legal Implications of

Human-like Robots as Innovators and Creators” (2016–17) 35 Cardozo Arts & Ent. L.J. 635; Enrico Bonadio, Luke McDonagh and Christopher Arvidsson, “Intellectual Property Aspects of Robotics” (2018) 9 European Journal of Risk Regulation 655; Jane Ginsburg and Luke Budiardjo, “Authors and Machines” (2018) 34 Berkeley Technology Law Journal 343; Nina Brown, “Artificial Authors: A Case for Copyright in Computer-Generated Works” (2018) 20 Columbia Science & Technology Law Review 1; Daniel Schönberger, “Deep Copyright: UP- and Downstream Questions Related to Artificial Intelligence (AI)” in Jacques De Werra (ed.), *Droit d’auteur 4.0 / Copyright 4.0* (Geneva/Zurich: Schulthess Editions Romandes, 2018); Shlomit Yanisky-Ravid and Luis Velez-Hernandez, “Copyrightability of Artworks Produced by Creative Robots and Originality: The Formality-Objective Model” (2018) 19 Minn. J.L. Sci. & Tech. 1; Garrett Huson, “I, Copyright” (2018) 35 Santa Clara High Technology Law Journal 54; Daryl Lim, “AI & IP: Innovation & Creativity in an Age of Accelerated Change” (2018) 52 Akron Law Review 813; Victor M. Palace, “What If Artificial Intelligence Wrote This: Artificial Intelligence and Copyright Law” (2019) 71 Fla L. Rev. 217; Tanya Aplin and Giulia Pasqualetto, “Artificial Intelligence and Copyright Protection” in Rosa Maria Ballardini, Petri Kuoppamäki and Olli Pitkänen (eds), *Regulating Industrial Internet Through IPR, Data Protection and Competition Law* (The Hague: Kluwer International, 2019); Tim Dornis, “Artificial Creativity: Emergent Works and the Void in Current IP Doctrine” (2020) 22 Yale Journal of Law & Technology 1. For a recent literature review on the subject, see *Technical Report by the Joint Research Centre (JRC) of the European Commission, authored by Maria Iglesias, Sharon Shamulia and Amanda Anderberg, Intellectual Property and Artificial Intelligence* (2020). For key papers from the 1960s–1990s: see Karl F. Milde Jr, “Can a Computer Be an ‘Author’ or an ‘Inventor’?” (1969) 51 J. Pat. 378; Timothy L. Butler, “Can a Computer be an Author – Copyright Aspects of Artificial Intelligence” (1982) 4 Hastings Comm. & Ent. L.J. 707; Stephen Hewitt, “Protection of Works Created by the Use of Computers” (1983) 133 New L.J. 235; Dan Rosen, “A Common Law for the Ages of Intellectual Property” (1984) 38 U. Miami L. Rev. 769; Evan H. Farr, “Copyrightability of Computer—created works” (1989) 15 R.U.C.T.L.J. 63; Robert J. Hart, “Author’s Own Intellectual Creation – Computer Generated Works” (1993) 9 Computer Law and Security Review 164; Arthur R. Miller, “Copyright Protection for Computer Programs, Databases, and Computer-Generated Works: Is Anything New Since CONTU?” (1993) 5 Harvard Law Review 977; Tal Viggerson, “Hamlet II: The Sequel: The Rights of Authors vs. Computer-Generated Read-Alike Works” (1994) 28 Loy. L.A. L. Rev. 401; Ralph Clifford, “Intellectual Property in the Era of the Creative Computer Program” (1997) 71 Tulane Law Review 1675; Andrew J. Yu, “From Video Games to Artificial Intelligence: Assigning Copyright Ownership to Works Generated by Increasingly Sophisticated Computer Programs” (1997) 25 AIPLA Q.J. 333.

28

Bridy, “The Evolution of Authorship” (2016) 39 Colum. J. L. & Arts 395, 395. That machines can be truly creative and autonomous is not unanimously accepted. Several commentators stress that human beings must still be considered in control of the whole AI generative process; see, for example, Ginsburg and Budiardjo, “Authors and Machines” (2018) 34 Berkeley Technology Law Journal 343, 344, 401–405 (noting that “[n]o machine is itself a source of creativity” and that every action of a machine is “the product of the precise articulation of commands by a human programmer or machine operator”). These authors believe that today’s generative machines are at best “faithful” and “obedient” agents of the humans who interact with them, and that execute specific instructions from them. A similar view is voiced by Hedrick, “I Think, Therefore I Create” (2019) 8 NYU J. Intell. Prop. & Ent. L. 324, 365, arguing that “there are human programmers and users who write the algorithm’s code, set the objective functions and other parameters of the algorithm, and decide whether the algorithm is creating the desired outputs or whether it ought to be tweaked. These humans are masterminding the creative process; even complex AI models are simply following the humans’ commands (or at least creative guidelines, criteria, and rules)” (p.332). Hedrick also argues that “[e]ven when an algorithm generates something H-creative (‘historically creative’ i.e., never before created by humans), such creativity is the result of the instructions and capabilities programmed by its creator and is therefore dictated by the (creative) choices of the programmer or user” (p.339). She further notes that “[the] programmer or user therefore “superintends” and “masterminds” the work of the algorithm, providing it with parameters that guide its functionality and data that determines its trajectory” (p.353); and that “algorithms can be programmed to exhibit apparent creativity as the result of built-in randomness and other rules, including commands to break certain rules in order to create more unique works. However, that creativity is still the result of those rules and of the creative choices made by the programmer and the user” (p.359).

29

Sam Ricketson, “People or Machines: The Berne Convention and the Changing Concept of Authorship” (1991–1992) 16 Colum. J. L. & Arts 1, 8 and 11 (adding that “[t]here must still be evident some human

contribution to the form of the work for which protection is claimed. To put it crudely, the work must not be generated by a machine or be the result of some organized industrial undertaking wherein it is impossible to identify an individual human creator or creators”).

See Ley 22/11 sobre la Propiedad Intelectual de 1987, Preamble: “los derechos que corresponden al autor, que es quien realiza la tarea puramente humana y personal de creacion de la obra y que, por lo mismo, constituyen el nucleo esencial del objeto de la presente Ley.”

French Code de la Propriété Intellectuelle art.L112-1. The French Code of intellectual property defines copyrightable subject-matter as “oeuvres de l’esprit”.

German Copyright Act (Urheberrechtsgesetz, UrhG) art.11.

This was confirmed by a dictum in *Urantia Foundation v Maaherra*, 895 F. Supp. 1337 (D. Ariz. 1995) at [957] (dealing with copyright in a work supposedly created by celestial voices).

Compendium of U.S. Copyright Office Practices §101 3rd edn (2017), p.306.

Compendium of U.S. Copyright Office Practices §101 (2017), p.313.

The Compendium of US Copyright Office Practices is a manual published by the Office, used by staff as a guide to the Office’s policies and procedures.

See Bridy, “The Evolution of Authorship” (2016) 39 Colum. J. L. & Arts 395, 395–397.

US Copyright Office, Register of Copyright, 67th Annual Report of the Register of Copyrights (1964), pp.7–8; see also Hedrick, “I Think, Therefore I Create” (2019) 8 NYU J. Intell. Prop. & Ent. L. 324, 365.

Acohs Pty Ltd v Ucorp Pty Ltd [2012] FCAFC 16.

Naruto v Slater, 2018 U.S. App. LEXIS 10129 (9th Cir. Cal., 23 April 2018).

Cummins v Bond [1927] 1 Ch. 167 Ch D; *Oliver v Saint Germain Foundation*, 41 F. Supp. 296 (S.D. Cal. 1941); *Urantia Foundation v Burton*, No.K 75-255 CA 4, 1980; *Urantia Foundation v Maaherra*, 895 F. Supp. 1337 (D. Ariz. 1995); *Penguin Books, Inc v New Christian Church of Full Endeavour*, No.96 CIV. 4126.

Infopaq International A/S v Danske Dagblades Forening (C-5/08) EU:C:2009:465; [2012] Bus. L.R. 102 at [35].

Painer v Standard Verlags GmbH (C-145/10) EU:C:2011:798; [2012 E.C.D.R. 6] at [88].

Painer v Standard Verlags GmbH, Opinion of A.G. Trsteniak (12 April 2011) (C-5/08) EU:C:2009:465; [2011] E.C.D.R. 13 at [121].

See Zhang Yangfei, “Court Rules AI-Written Article Has Copyright”, (9 January 2020), *China Daily*, <https://www.chinadaily.com.cn/a/202001/09/WS5e16621fa310cf3e3558351f.html> [Accessed 18 March 2020].

Justine Pila, “An Intentional View of the Copyright Work” (2008) 71 Modern Law Review 535. See also Daniela Simone, *Copyright and Collective Authorship: Locating the Authors of Collaborative Work* (Cambridge: Cambridge University Press, 2019), and Luke McDonagh, “Rearranging the Roles of the Performer and Composer in the Music Industry – the Potential Significance of Fisher v Brooker” [2012] I.P.Q. 64.

Lucasfilm Ltd v Ainsworth [2011] UKSC 39; [2012] 1 A.C. 208.

Such a point has been raised in the context of the US copyright system by Yaniski-Ravid and

Velez-Hernandez, “Copyrightability of Artworks Produced by Creative Robots and Originality: The Formality-Objective Model” (2018) 19 Minn. J.L. Sci. & Tech. 1, 33–35, 41–42 (also noting that “adopting an objective perspective of originality would enable judges and juries to evaluate works made not only by humans, who act with intention, but also works created by creative robots, for which it remains difficult to understand the concept of consciousness and intention ... In other words, we claim that the creator’s subjective intention to make a derivative work is irrelevant ... [T]he objective criterion is inevitable for Internet or computer-generated works as there are no subjective feelings involved”).

See 17 U.S.C. §101 (including the definition of “work made for hire”). In the UK commissioned works are, in the absence of agreement to the contrary, owned by the artist in the first instance.

Bridy, “Coding Creativity: Copyright and the Artificially Intelligent Author” (2012) Stanford Technology Law Review 1; see also Hristov, “Artificial Intelligence and the Copyright Dilemma” (2016) 57 IDEA: The IP Law Review 431, 447.

Bridy, “The Evolution of Authorship” (2016) 39 Colum. J. L. & Arts 395, 400.

Palace, “What If Artificial Intelligence Wrote This: Artificial Intelligence and Copyright Law” (2019) 71 Fla L. Rev. 217, 235 (proposing to amend 17 U.S.C. §101 of the US Copyright Act by specifying that a “work made for hire” is also “a work generated by a computer in circumstances such that there is no human author”).

Glasser, “Copyrights in Computer-Generated Works: Whom, If Anyone, Do We Reward?” (2001) 1 Duke L. & Tech. Rev. 24.

Butler, “Can a Computer be an Author?” (1982) 4 Hastings Comm. & Ent. L.J. 707, 741, 743–744.

Gervais, “The Machine as Author” (2019) 105 Iowa Law Review 1.

CONTU Commission Final Report (1978), p.45.

Samuelson, “Allocating Ownership Rights in Computer-Generated Works” (1985–86) 47 U. Pitt. L. Rev. 1208, 1215.

Butler, “Can a Computer be an Author?” (1982) 4 Hastings Comm. & Ent. L.J. 707, 743.

See also Dorotheou, “Reap the Benefits and Avoid the Legal Uncertainty” (2015) 21 C.T.L.R. 85, 90 (noting that “[t]he connection between the programmer’s work (i.e. the underlying code) and the final work is too remote” and that in AI scenarios “the device is thinking entirely by itself. There can no longer be a link to the programmer, irrespective of whether the programmer was the original creator. The relationship exhibits parallels to that of a parent and child. Without the parent, the child would not exist. However, once the child grows up and becomes able to think and interact by itself, the parent can no longer claim ownership over things created by its offspring. There is clear break between the algorithm that underpins the artificial intelligence device and the final output. Therefore the principles of derivative works do not apply, and the programmer cannot claim to be the author through derivative works”).

This provision just applies in case of literary, dramatic, musical or artistic works generated by computers. It seems thus to suggest that other types of works that may be produced by machines such as movies, software, or databases are not copyright protected: see Alessio Chiabotto, “Intellectual Property Rights over non-human generated creations” (28 February 2017), SSRN, <https://ssrn.com/abstract=3053772> [Accessed 18 March 2020].

See Copyright, Designs and Patents Act 1988 s.178.

Namely, Ireland, New Zealand, India, South Africa and Hong Kong. This provision also inspired the 1990 WIPO Draft Model Copyright Law, which provides that the original owner of the economic rights in a computer-generated work may be either the person or entity “by whom or by which the arrangements necessary for the creation of the work are undertaken” or the person or entity “at the initiative and under the

responsibility of whom or of which the work is created and disclosed”: see *International Bureau of WIPO, Preparatory Document, Draft Model Law on Copyright*, pp.258-59 (No.CD/MPC/III2, 30 March 1990).

63 The need for an expansion of the concept of author has been acknowledged for long time in legal scholarship, including in the US since the 1980s: see Butler, “Can a Computer be an Author?” (1982) 4 *Hastings Comm. & Ent. L.J.* 707, 744–745 (noting that “[w]hen courts find that a given product of AI software is authored by machine rather than a person, the court should presume the existence of a fictional human author”).

64 Also, the CDPA has opted to use the term “author” when referring to the creator of a computer-generated work rather than, for example, the more neutral word “maker”, which is used in the EU Database Directive to define the person that comes up with a database (art.7.1). One may thus wonder whether the UK CDPA has tried to “humanise” computer-generated works by avoiding using impersonal and neutral terminology; see also Hart, “Author’s Own Intellectual Creation” (1993) 9 *Computer Law and Security Review* 164, 165.

65 Yangfei, “Court Rules AI-Written Article Has Copyright” (9 January 2020), *China Daily*, <https://www.chinadaily.com.cn/a/202001/09/WS5e16621fa310cf3e3558351f.html> [Accessed 18 March 2020].

66 Andreas Rahmatian, “Originality in UK Copyright Law: The Old ‘Skill and Labour’ Doctrine Under Pressure (2013)” 44 *International Review of Intellectual Property and Competition Law* 4.

67 See also Guadamuz, “Do Androids Dream of Electric Copyright?” [2017] *I.P.Q.* 169, 176; Lionel Bently, mentioned by Begoña González Otero and Joao Pedro Quintais, “Before the Singularity: Copyright and the Challenges of Artificial Intelligence”, *Kluwer Copyright Blog* (2018), <http://copyrightblog.kluweriplaw.com/2018/09/25/singularity-copyright-challenges-artificial-intelligence> [Accessed 18 March 2020] (stressing that the CDPA provisions on computer-generated works do not offer a useful model for protecting AI outputs, because of their incompatibility with the EU copyright *acquis* and failure to address the issue of originality).

68 See also David Vaver, “Translation and Copyright: A Canadian Focus” (1994) 4 *E.I.P.R.* 159 (noting, in relation to the expansion of the concept of author, that “computer-generated works join the list of other works for which the UK Act has created a fictitious author: the producer of a film or sound record, the maker of a broadcast, the provider of a cable service programme – almost all of which are equally fictitious persons, that is, corporations rather than humans”).

69 Ricketson, “People or Machines: The Berne Convention and the Changing Concept of Authorship” (1991–92) 16 *Colum. J. L. & Arts* 1, 16.

70 CDPA s.79(2); see also New Zealand Copyright Act s.97(2)(b).

71 CDPA s.81(2); see also New Zealand Copyright Act s.100(2)(b).

72 See also Boyden, “Emergent Works” (2016) 39 *Colum. J.L. & Arts* 377, 391 (noting that works created by machines “need no protection under a moral rights theory as the expression of a human being’s personhood, nor under a natural rights theory as intellectual labor, because again there is neither human creativity nor labor involved in their production”).

73 UK, HL Deb. (25 February 1988), Vol.493, col.1305 (mentioned by Guadamuz, “Do Androids Dream of Electric Copyright?” [2017] *I.P.Q.* 169, 176).

74 *Nova Productions v Mazooma Games* [2007] *EWCA Civ.* 219; [2007] *Bus. L.R.* 1032.

75 *Nova Productions v Mazooma Games* [2007] *EWCA Civ.* 219; [2007] *Bus. L.R.* 1032 at [106]. A similar conclusion was reached by US courts in *Williams Electronics Inc v Artic International Inc*, 685 F. 2d 870 (3d Cir. 1982), and *Midway Manufacturing Inc v Artic International Inc*, 704 F. 2d 1009 (7th Cir.), *cert denied*, 464 U.S. 823 (1983). In the latter case, the court in particular noted that “[t]he question is whether

the creative effort in playing a video game is enough like writing or painting to make each performance of a video game the work of the player and not the game's inventor. We think it is not The player of a video game does not have control over the sequence of images that appears on the video game screen".

⁷⁶ Lorna Brazell, "Can Copyright Survive Artificial Intelligence?" (8 February 2018), <https://www.scl.org/articles/10139-can-copyright-survive-artificial-intelligence> [Accessed 18 March 2020].

⁷⁷ Ramalho, "Will Robots Rule the (Artistic) World?" (2017) 21 Journal of Internet Law 12, 12–20. See also Ginsburg and Budiardjo, "Authors and Machines" (2018) 34 Berkeley Technology Law Journal 343, where examples such as Minecraft are discussed.

⁷⁸ See also Brown, "Artificial Authors: A Case for Copyright in Computer-Generated Works" (2018) 20 Columbia Science & Technology Law Review 1, 24.

⁷⁹ *Kogan v Martin* [2019] EWCA Civ 1645; [2020] E.M.L.R. 4.

⁸⁰ Boyden, "Emergent Works" (2016) 39 Colum. J.L. & Arts 377, 384; see also Miller, "Copyright Protection for Computer Programs, Databases, and Computer-Generated Works" (1993) 5 Harvard Law Review 977, 1059 (highlighting the need to settle for a case-by-case approach that examines the specific facts and the various contributions to the work's creation).

⁸¹ Glasser, "Copyrights in Computer-Generated Works" (2001) 1 Duke L. & Tech. Rev. 24; see also Hristov, "Artificial Intelligence and the Copyright Dilemma" (2016) 57 IDEA: The IP Law Review 431, 444.

⁸² Hedrick, "I Think, Therefore I Create" (2019) 8 NYU J. Intell. Prop. & Ent. L. 324, 346.

⁸³ Rosen, "A Common Law for the Ages of Intellectual Property" (1984) 38 U. Miami L. Rev. 769, 803–804 (noting that, even though the robot takes decisions on its own, such decisions are taken within boundaries established by the programmer, and that the programmer's decision to put the machine in the position to decide is itself an artistic decision).

⁸⁴ Hedrick, "I Think, Therefore I Create" (2019) 8 NYU J. Intell. Prop. & Ent. L. 324, 341.

⁸⁵ Bridy, "The Evolution of Authorship" (2016) 39 Colum. J. L. & Arts 395.

⁸⁶ Bridy, "The Evolution of Authorship" (2016) 39 Colum. J. L. & Arts 395.

⁸⁷ Yet, this argument cannot be relied on when it comes to highly interactive programs such as modern videogames, including the above-mentioned Minecraft, where users have an active role in the creative process.

⁸⁸ Dorotheou, "Reap the Benefits and Avoid the Legal Uncertainty" (2015) 21 C.T.L.R. 85, 90. Yet, see also Samuelson, "Allocating Ownership Rights in Computer-Generated Works" (1985–86) 47 U. Pitt. L. Rev. 1208, 1202–1203, reminding us that whomever tape-records a live performance of a sound recording, i.e. a person who just presses a button, is considered as "author".

⁸⁹ Perry and Margoni, "From Music Tracks to Google Maps: Who Owns Computer-Generated Works?" (2010) 26 C.L.S.R. 621, p. 8.

⁹⁰ Hristov, "Artificial Intelligence and the Copyright Dilemma" (2016) 57 IDEA: The IP Law Review 431, 444–445.

⁹¹ Glasser, "Copyrights in Computer-Generated Works" (2001) 1 Duke L. & Tech. Rev. 24; see also Yanisky-Ravid, "Generating Rembrandt" (2017) Mich. St. Law Review 659, 670, 675 (adding that "the human inventor or programmer of such a machine seems to have no more claim to a copyright in such a work than an artist's mother has to her child's work, or than a camera manufacturer has to the photos taken by photographers, or than a piano manufacturer has to the melody being created by the musicians while using the instrument").

- 92 Samuelson, “Allocating Ownership Rights in Computer-Generated Works” (1985–86) 47 U. Pitt. L. Rev. 1208, 1209.
- 93 Samuelson, “Allocating Ownership Rights in Computer-Generated Works” (1985–86) 47 U. Pitt. L. Rev. 1208, 1220. See also Caen A. Demic, “AI-Generated Fashion Designs: Who or What Owns the Goods?” (2020) 30 Fordham Intellectual Property, Media and Entertainment Law Journal 593 (making the point that—when it comes to AI creations in the field of designs—end-users, namely fashion houses or independent designers, should be considered authors).
- 94 Hedrick, “I Think, Therefore I Create” (2019) 8 NYU J. Intell. Prop. & Ent. L. 324, 344–346.
- 95 Yanisky-Ravid, “Generating Rembrandt” [2017] Mich. St. Law Review 659, 706; see also Ralston, “Copyright in Computer-Composed Music” (2005) 52 J. Copyright Soc’y U.S.A. 281, 290 (noting that controls are often provided by the programmer to users, including enabling/disabling music input, enabling/disabling random input, random number generator parameters, and composer module parameters).
- 96 Hedrick, “I Think, Therefore I Create” (2019) 8 NYU J. Intell. Prop. & Ent. L. 324, 344–346.
- 97 Grubow, “O.K. Computer” (2018) 40 Cardozo Law Review 397. Yet, see also Andrew J. Yu, “From Video Games to Artificial Intelligence” (1997) 25 AIPLA Q.J 131, 151–152.
- 98 Yu, “From Video Games to Artificial Intelligence” (1997) 25 AIPLA Q.J 131, 162.
- 99 Hedrick, “I Think, Therefore I Create” (2019) 8 NYU J. Intell. Prop. & Ent. L. 324, 344–346.
- 100 Brown, “Artificial Authors: A Case for Copyright in Computer-Generated Works” (2018) 20 Columbia Science & Technology Law Review 1, 39; see also Cronin, “Virtual Music Scores, Copyright and the Promotion of a Marginalized Technology” (2004) 28 Colum. J.L. & Arts 18, 19 (noting that purchases of programs by users would motivate the programmer to create the software in the first place).
- 101 Denicola, “Ex Machina: Copyright Protection for Computer-Generated Works” (2016) 69 Rutgers L. Rev. 251, 283–285; see also Samuelson, “Allocating Ownership Rights in Computer-Generated Works” (1985–86) 47 U. Pitt. L. Rev. 1185, 1203, 1207–1208 (noting that by licensing the use of the generator program the programmer implicitly grants the user rights in whatever output is generated from the computer program; and that the purchaser of the program can reasonably assume that the acquisition of the program brings with it the right to use the created output).
- 102 Yanisky-Ravid, “Generating Rembrandt” [2017] Mich. St. Law Review 659, 702.
- 103 Brown, “Artificial Authors: A Case for Copyright in Computer-Generated Works” (2018) 20 Columbia Science & Technology Law Review 1, 37.
- 104 Yu, “From Video Games to Artificial Intelligence” (1997) 25 AIPLA Q.J 131; see also Dorotheou, “Reap the Benefits and Avoid the Legal Uncertainty” (2015) 21 C.T.L.R. 85, 89 (noting that the idea that the programmer would automatically own everything that the AI device is capable of producing would be an undesirable outcome as it would over-reward the programmer). See also Denicola, “Ex Machina: Copyright Protection for Computer-Generated Works” (2016) 69 Rutgers L. Rev. 251, 283–285 (arguing that giving programmers copyright may often turn out to be useless as programmers themselves would frequently be unaware of the creation of works by users).
- 105 See McCutcheon, “The Vanishing Author in Computer-Generated Works” (2013) 36 Melbourne University Law Review 915.
- 106 Glasser, “Copyrights in Computer-Generated Works” (2001) 1 Duke L. & Tech. Rev. 24.
- 107 Ralston, “Copyright in Computer-Composed Music” (2005) 52 J. Copyright Soc’y U.S.A. 281, 295–296; see also Boyden, “Emergent Works” (2016) 39 Colum. J.L. & Arts 377, 386 (perceiving the collaboration

between the programmer and user as a sort of spectrum and noting that “[a]s the amount of user control over the work increases, the programmer contributions decrease”).

Samuelson, “Allocating Ownership Rights in Computer-Generated Works” (1985–86) 47 U. Pitt. L. Rev. 1185, 1202–1203 (comparing the user to the person who records a jazz improvisation session, and therefore fixes the work).

Samuelson, “Allocating Ownership Rights in Computer-Generated Works” (1985–86) 47 U. Pitt. L. Rev. 1185, 1222; see also Butler, “Can a Computer be an Author?” (1982) 4 Hastings Comm. & Ent. L.J. 707, 740 (noting that “[i]n the man-machine joint author situation, the concept of an ‘agreement’ has little meaning”).

Ralston, “Copyright in Computer-Composed Music” (2005) 52 J. Copyright Soc’y U.S.A. 281, 306.

Hewitt, “Protection of Works Created by the Use of Computers” (1983) 133 New L.J. 235, 236–237.

Hewitt, “Protection of Works Created by the Use of Computers” (1983) 133 New L.J. 235, 236.

Timothy Pinto, “Robo ART! The Copyright Implications of Artificial Intelligence Generated Art” (2019) 30 Ent. L.R. 177 (making the point that the UK originality test allows for copyright in AI generated art to subsist even where there is no human author; and in particular that it is easier to accept that an AI machine exercises skill, labour and judgement). See also *Jacob Turner, Robot Rules: Regulating Artificial Intelligence* (Cham: Palgrave Macmillan US, 2008), p.122 (noting that “there is a good argument for saying that AI is even *more* creative than humans, in that all humans are restricted by our biological faculties, whereas AI is capable of thinking and operating in an entirely different manner”).

Grubow, “O.K. Computer” (2018) 40 Cardozo Law Review 409 (noting that “[n]eural networks are an AI’s unique DNA and, perhaps, give AIs their ‘personality’ which allows for greater variance in its outputs as it learns more music. This function is no different than when a human composer’s compositional style changes as they are exposed to new musical styles. Both entities grow with experience”).

Milde, “Can a Computer Be an ‘Author’ or an ‘Inventor’?” (1969) 51 J. Pat. 378, 403 (also noting, at 393–395, that, when the computer exercises independent creation, it should at least be considered a co-author of the work it creates, together with the programmer and the person who provided it with data); on AI as co-author see also Grubow, “O.K. Computer” (2018) 40 Cardozo Law Review 409, 416–418. For an opposite position see Butler, “Can a Computer be an Author?” (1982) 4 Hastings Comm. & Ent. L.J. 707 740–741 (noting that “[i]n the man-machine joint author situation, the concept of an ‘agreement’ has little meaning ... the law does not contemplate a man/machine ‘joint author’”).

Dorotheou, “Reap the Benefits and Avoid the Legal Uncertainty” (2015) 21 C.T.L.R. 85, 91.

See also Miller, “Copyright Protection for Computer Programs, Databases, and Computer-Generated Works” (1993) 5 Harvard Law Review 977, 1043 (noting that “[t]he technology has not yet produced a world of copyright without human authors, and there is no reason to believe that we are en route to that world or, even if we are, that we will reach it in the foreseeable future”); Ginsburg and Budiardjo, “Authors and Machines” (2018) 34 Berkeley Technology Law Journal 343 (making the argument that all computers, even the most advanced in machine learning, do not originate anything, but they just follow orders); Grimmelmann, “There’s No Such Thing as a Computer-Authored Work” (2016) 39 Colum. J. L. & Arts 377 (starting his article by noting: “I would like to talk about computer-authored works—I would like to, except that they don’t exist”); Yu, “From Video Games to Artificial Intelligence” (1997) 25 AIPLA Q.J. 131, 156.

Bridy, “Coding Creativity: Copyright and the Artificially Intelligent Author” (2012) Stanford Technology Law Review 1; Butler, “Can a Computer be an Author?” (1982) 4 Hastings Comm. & Ent. L.J. 707, 740 (noting that “the notion of a machine having legal rights and duties is absurd”).

Dorotheou, “Reap the Benefits and Avoid the Legal Uncertainty” (2015) 21 C.T.L.R. 85, 91.

Dorotheou, “Reap the Benefits and Avoid the Legal Uncertainty” (2015) 21 C.T.L.R. 85, 91.

Glasser, “Copyrights in Computer-Generated Works” (2001) 1 Duke L. & Tech. Rev. 24; see also Butler, “Can a Computer be an Author?” (1982) 4 Hastings Comm. & Ent. L.J. 707, 739 (wondering how a machine could be a real party in interest in a lawsuit); Farr, “Copyrightability of Computer-created Works” (1989) 15 R.U.C.T.L.J. 63, 79; Clifford, “Intellectual Property in the Era of the Creative Computer Program” (1997) 71 Tulane Law Review 1675, 1686 (noting that “the computer would need the power to engage in voluntary and knowing behaviour”).

Dorotheou, “Reap the Benefits and Avoid the Legal Uncertainty” (2015) 21 C.T.L.R. 85, 91.

Sobel, “Artificial Intelligence’s Fair Use Crisis” (2017) 41 Colum. J.L. & Arts 45, 45.

Dani Deahl, “How AI-Generate Music is Changing the Way Hits are Made” (31 August 2019), <https://www.theverge.com/2018/8/31/17777008/artificial-intelligence-taryn-southern-amper-music> [Accessed 19 March 2020].

Yanisky-Ravid, “Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era” [2017] Mich. St. Law Review 659, 669.

Peter Schjeldahl, “A Few Words About the Faux Rembrandt” (8 April 2016), *The New Yorker*, <https://www.newyorker.com/culture/culture-desk/a-few-words-about-the-faux-rembrandt> [Accessed 19 March 2020].

See also Celine Melanie A. Dee, “Examining Copyright Protection of AI-Generated Art” (2018) 1 Delphi – Interdisciplinary Review of Emerging Technologies 31, 36.

Sobel, “Artificial Intelligence’s Fair Use Crisis” (2017) 41 Colum. J.L. & Arts 45, 62.

Jean-Marc Deltorn, “Deep Creations: Intellectual Property and the Automata” (1 February 2017), <https://www.frontiersin.org/articles/242911> [Accessed 19 March 2020].

Stephen Carlisle, “Should Music Created by Artificial Intelligence Be Protected by Copyright?” (7 June 2019), <http://copyright.nova.edu/ai> [Accessed 19 March 2020]; see also Sobel, “Artificial Intelligence’s Fair Use Crisis” (2017) 41 Colum. J.L. & Arts 45, 66 (focusing on the difficulties to assess access to copyright works, and in particular noting that “[t]he situation is indeed complicated when an allegedly copied work is absent in input data. This phenomenon could have several causes: perhaps the model was programmed to find input data by crawling the web on its own, and its activities were not logged. Or, most intriguing, perhaps the model was given a known, finite set of input data that excluded the plaintiff’s work, and nevertheless created substantially similar output. This is not as farfetched as it sounds: consider a machine learning model instructed to generate funk music, trained on a corpus of all funk recordings except the work of James Brown, the definitive originator of the genre. All funk songs bear a debt to James Brown, so it would not be altogether surprising if the funky AI generated output that was substantially similar to his work”).

Sobel, “Artificial Intelligence’s Fair Use Crisis” (2017) 41 Colum. J.L. & Arts 45, 45; Lim, “AI & IP: Innovation & Creativity in an Age of Accelerated Change” (2018) 52 Akron Law Review 813.

Kelly v Arriba and *Perfect10 v Amazon* (*Kelly v Arriba Soft Corp*, 336 F. 3d 811 (9th Cir. 2003)).

Perfect 10 Inc v Amazon.com Inc., 508 F. 3d 1146 (9th Cir. 2007).

For the first judicial acknowledgment of non-expressive fair use, see *Sega Enterprises Ltd v Accolade Inc*, 977 F. 2d 1510 (9th Cir. 1992).

Authors Guild Inc v Google Inc, 954 F. Supp. 2d 282 (S.D.N.Y. 2013); *Authors Guild v Google Inc*, 804 F. (3d) 202 (2nd Cir 2015).

136 *A.V. ex rel. Vanderhye v iParadigms LLC*, 562 F. 3d 630 (4th Cir. 2009).

137 Giovanni Sartor, Francesca Lagioia and Giuseppe Contissa, “The Use of Copyrighted Works by AI Systems: Art Works in the Data Mill” (2018), SSRN, https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3264742 [Accessed 19 March 2020].

138 See Benjamin Sobel’s interview with the intellectual property blog Ipwatch, <https://www.ip-watch.org/2017/08/23/dilemma-fair-use-expressive-machine-learning-interview-ben-sobel/> [Accessed 19 March 2020].

139 This example is given by Schafer, Komuves, Zatarain and Diver, “A Fourth Law of Robotics?” (2015) 23 Artificial Intelligence and Law 217.

140 See fn.16.

141 There is obviously no point in engaging in a fair use debate when the works analysed by the machine have already fallen into the public domain, and therefore are no longer protected by copyright, as happened for *The Next Rembrandt* (the Dutch maestro died in 1669).

142 Lim, “AI & IP: Innovation & Creativity in an Age of Accelerated Change” (2018) 52 Akron Law Review 813 (commenting on the AI music composer Jukedeck and noting in particular that “[t]here is no doubt that AI-generated, royalty-free sound recordings would jeopardize the market for recordings that are composed and performed by humans in a traditional fashion. Jukedeck’s rates are lower than what it would cost to license a conventional sound recording, and its output is not limited by the constraints human composers or recording artists face”).

143 Sobel, “Artificial Intelligence’s Fair Use Crisis” (2017) 41 Colum. J.L. & Arts 45, 78.

144 Gervais, “The Machine as Author” (2019) 105 Iowa Law Review 1.

145 Carlisle, “Should Music Created by Artificial Intelligence Be Protected by Copyright?” (7 June 2019), <http://copyright.nova.edu/ai> [Accessed 19 March 2020].

146 Sobel, “Artificial Intelligence’s Fair Use Crisis” (2017) 41 Colum. J.L. & Arts 45, 82; see also Lim, “AI & IP: Innovation & Creativity in an Age of Accelerated Change” (2018) 52 Akron Law Review 813. (arguing that machines that create commercially valuable music, literature and art after being trained on copyright material “chafes uncomfortably against interests that normally attract infringement liability if done by humans”).

147 James Grimmelman, “Copyright for Literate Robots” (2016) 101 Iowa Law Review 657, 658 and 674–675 (noting provocatively that “copyright has concluded that reading by robots doesn’t count. Infringement is for humans only; when computers do it, it’s fair use”; adding that “a transformative fair use that categorically exempts robots means that a digital humanist can skim a million books with abandon while a humanist who reads a few books closely must pay full freight for hers”; and that “[r]ebroadcast one radio station for humans and you’re an infringer; copy a thousand TV stations for computers and you’re a fair use hero”).

148 Amanda Levendowski, “How Copyright Law Can Fix Artificial Intelligence’s Implicit Bias Problem” (2018) 93 Washington Law Review 579, 625 (also noting that “A best-selling novel becomes data about how humans use language; a selfie becomes data about the features of the human face; a conversation from a film becomes data about human voices”).

149 Lim, “AI & IP: Innovation & Creativity in an Age of Accelerated Change” (2018) 52 Akron Law Review 813.

150 Sobel, “Artificial Intelligence’s Fair Use Crisis” (2017) 41 Colum. J.L. & Arts 45, 89.

151 Levendowski, “How Copyright Law Can Fix Artificial Intelligence’s Implicit Bias Problem” (2018) 93

Washington Law Review 579, 589.

Levendowski, “How Copyright Law Can Fix Artificial Intelligence’s Implicit Bias Problem” (2018) 93 Washington Law Review 579, 589.

Levendowski, “How Copyright Law Can Fix Artificial Intelligence’s Implicit Bias Problem” (2018) 93 Washington Law Review 579, 589.

Louise Matsakis, “Copyright Law Makes Artificial Intelligence Bias Worse” (2017), https://motherboard.vice.com/en_us/article/59ydmx/copyright-law-artificial-intelligence-bias [Accessed 19 March 2020] (also noting that in reality, due to potential copyright implications, “major AI companies keep the data they use to train their products a secret, preventing journalists and academics from uncovering biases, as well as stifling competition”).

See again Levandowski, “How Copyright Law Can Fix Artificial Intelligence’s Implicit Bias Problem” (2018) 93 Washington Law Review 579, 630.

See Directive 2001/29 on the harmonisation of certain aspects of copyright and related rights in the information society (Info-Society Directive) art.5(1).

See also Thomas Margoni, “Artificial Intelligence, Machine Learning and EU Copyright Law: Who Owns AI?”, CREATE Working Paper 2018/12 (2018).

This example is given by Schafer, Komuves, Zatarain and Diver, “A Fourth Law of Robotics?” (2015) 23 Artificial Intelligence and Law 217.

Schönberger, “Deep Copyright: UP- and Downstream Questions Related to Artificial Intelligence (AI)” in *Droit d’auteur 4.0 / Copyright 4.0* (2018), pp.16–17.

Info-Society Directive art.5(5).

Football Association Premier League Ltd v QC Leisure (C-403/08) EU:C:2011:631; [2012] Bus. L.R. 1321; and *Karen Murphy v Media Protection Services Ltd* (C-429/08) EU:C:2011:631.

See Directive 2019/790 on copyright and related rights in the Digital Single Market arts 3 and 4. Article 3 in particular exempts from copyright infringement the reproduction of copyrighted material.

See Directive 2019/790 art.2(2), which defines text and data mining as “any automated analytical technique aimed at analyzing text and data in digital form in order to generate information which includes but is not limited to patterns, trends and correlations”.

See Directive 2019/790 art.3.

See also Directive 2019/790, Recital 11 (highlighting EU policies which encourage “universities and research institutes to collaborate with the private sector”).

The UK CDPA also provides a text- and data-mining exception, which is limited to the copying of works for the sole purpose of research for a non-commercial purpose: see CDPA s.29A.

See Directive 2019/790 art.4.

Eleonora Rosati, “Copyright as an Obstacle or an Enabler? A European Perspective on Text and Data Mining and its Role in the Development of AI Creativity” (2019) 27 Asia Pacific Law Review 198.

Gervais, “The Machine as Author” (2019) 105 Iowa Law Review 1 (noting that “machine productions are not protectible by copyright once the machine has crossed what the Article calls the autonomy threshold and is no longer a tool in the user’s hands or a reflection of its (human-made) program”); see also Yu, “From Video Games to Artificial Intelligence” (1997) 25 AIPLA Q.J 333, 1265–1266.

- 170 Khoury, “Intellectual Property Rights for Hubots” (2016–17) 35 *Cardozo Arts & Ent. L.J.* 635, 668; see also Hewitt, “Protection of Works Created by the Use of Computers” (1983) 133 *New L.J.* 235.
- 171 Lim, “AI & IP: Innovation & Creativity in an Age of Accelerated Change” (2018) 52 *Akron Law Review* 813 (noting how according to several commentators the fall into the public domain of these works will provide fertilizer “to give birth to new artistic genres and whole new areas of innovation, where humans could build freely upon initial machine-output”).
- 172 Clifford, “Intellectual Property in the Era of the Creative Computer Program” (1997) 71 *Tulane Law Review* 1675, 1702-1703.
- 173 Levendowski, “How Copyright Law Can Fix Artificial Intelligence’s Implicit Bias Problem” (2018) 93 *Washington Law Review* 579, 597. See also Benoit Michaux, “*Singularité technologique, singularité humaine et droit d’auteur*” in *Laws, Norms and Freedoms in Cyberspace/Droits, normes et libertés dans le cybermonde* (Brussels: Larcier, 2018), pp.401–416 (noting that copyright protection of AI-produced outputs could bring an increase in the number of protected works and favour the concentration of copyrights in the hands of a few companies).
- 174 Palace, “What If Artificial Intelligence Wrote This?” (2019) 71 *Fla L. Rev.* 217, 237.
- 175 See fn.38.
- 176 McCutcheon, “The Vanishing Author in Computer-Generated Works” A Critical Analysis of Recent Australian Case Law” (2013) 36 *Melbourne University Law Review* 915.
- 177 See for example Bently, mentioned by Otero and Quintais, “*Before the Singularity: Copyright and the Challenges of Artificial Intelligence*” (2018), *Kluwer Copyright Blog*, <http://copyrightblog.kluweriplaw.com/2018/09/25/singularity-copyright-challenges-artificial-intelligence> [Accessed 18 March 2020]; Perry and Margoni, “From Music Tracks to Google Maps: Who Owns Computer-Generated Works?” 2010) 26 *C.L.S.R.* 621; Gervais, “The Machine as Author” (2019) 105 *Iowa Law Review* 1; Garry Gabison, “Who Holds the Right to Exclude for Machine Work Products?” [2020] *I.P.Q.* 20.
- 178 See also McCutcheon, “The Vanishing Author in Computer-Generated Works: A Critical Analysis of Recent Australian Case Law” (2013) 36 *Melbourne University Law Review* 915, 952 (noting that “while the incentive of copyright may be irrelevant to a novelist compelled to write their opus, it may well explain why an expensive computer-generated production is made. Without that reward, the work may not be made ... or disseminated”).
- 179 Hristov, “Artificial Intelligence and the Copyright Dilemma” (2016) 57 *IDEA: The IP Law Review* 431, 439.
- 180 Hedrick, “I Think, Therefore I Create” (2019) 8 *NYU J. Intell. Prop. & Ent. L.* 324, 350 (casting doubts on whether these factors are really determinant).
- 181 Yu, “The Machine Author: What Level of Copyright Protection Is Appropriate for Fully Independent Computer-Generated Works?” (2017) 165 *U. Pa. L. Rev.* 1245, 1264.
- 182 Raquel Acosta, “*Artificial Intelligence and Authorship Rights*” (17 February 2012), <http://jolt.law.harvard.edu/digest/artificial-intelligence-and-authorship-rights> [Accessed 19 March 2020] (noting that if AI programmers come up with “some sort of novel invention in the creation of the program, such as developing a predictive algorithm that allows a two dimensional image to be easily converted to a 3D image, they may apply for patent protection of that algorithm”). See also Jean-Marc Deltorn and Franck Macrez, “*Authorship in the Age of Machine learning and Artificial Intelligence*”. *Centre for International Intellectual Property Studies (CEIPI) Research Paper No.2018-10* (2018).
- 183 Ginsburg and Budiardjo, “Authors and Machines” (2018) 34 *Berkeley Technology Law Journal* 343, 455;

McCutcheon, “The Vanishing Author in Computer-Generated Works” A Critical Analysis of Recent Australian Case Law” (2013) 36 Melbourne University Law Review 915.

184 Robert Plotkin, *The Genie in the Machine: How Computer-Automated Inventing is Revolutionizing Law & Business* (Stanford, CA: Stanford Law Books, 2009), pp.83–84.

185 Anne Lauber-Rönsberg and Sven Hetmank, “The Concept of Authorship under Pressure: Does Artificial Intelligence Shift Paradigms?” (2019) 14 J.I.P.L.P. 509, 577. See also Saiz García, “Las obras creadas por sistemas de inteligencia artificial y su protección por derecho de autor” [2019] InDret, Revista para el análisis del derecho; Ramalho, “Will Robots Rule the (Artistic) World?” (2017) 21 Journal of Internet Law 12, 16–20 (proposing to adopt a (i) regime similar to the EU database right under the [EU Database Directive \(Directive 1996/9\)](#), which notoriously aims at protecting investments made in producing compilation of data; or (ii) a sort of “disseminator’s right” comparable to the publisher’s right in the publication of previously unpublished works provided by the [EU Term of Protection Directive \(Directive 93/98\)](#), replaced by [Directive 2006/116](#)). The second proposal is more concerned with enhancing the accessibility of AI produced content: while such a right would be inherently economic, it would allow the right holder to extract value out of the creations and at the same time aim at encouraging the dissemination of algorithmic output. For academic opinions against sui generis systems of protection of AI-generated outputs, see Patrick Goold, “Artificial Authors? Copyright in Works of Machine Learning: A Call to Orthodoxy” (2020 draft paper, on file with the authors).

186 Yu, “The Machine Author: What Level of Copyright Protection Is Appropriate for Fully Independent Computer-Generated Works?” (2017) 165 U. Pa. L. Rev. 1245.

187 AIPPI Summary Report – 2019 Study Question on Copyright/Data Copyright in Artificially Generated Works, p.17,
https://aippi.org/wp-content/uploads/2019/08/SummaryReport_COPYRIGHT-DATA_London2019_final_160719.pdf [Accessed 19 March 2020].

188 [Section 12\(7\) of the CDPA](#) states that copyright in computer-generated works “expires at the end of the period of 50 years from the end of the calendar year in which the work was made”.

189 Gervais, “The Machine as Author” (2019) 105 Iowa Law Review 1. On intrinsic motivations as factors which stimulate creativity, see Christopher Buccafusco and Christopher Sprigman, “Experiments in Intellectual Property” in Peter Menell and David Schwartz (eds), *Research Handbook on the Economics of Intellectual Property Law* (Cheltenham: Edward Elgar, 2016).

190 AIPPI Summary Report, pp.7–8,
https://aippi.org/wp-content/uploads/2019/08/SummaryReport_COPYRIGHT-DATA_London2019_final_160719.pdf [Accessed 19 March 2020] (French Group position).

191 AIPPI Summary Report, p.13,
https://aippi.org/wp-content/uploads/2019/08/SummaryReport_COPYRIGHT-DATA_London2019_final_160719.pdf [Accessed 19 March 2020] (UK Group position).

192 See again AIPPI Summary Report, p.17, (German Group) (noting that a shorter term of protection is justified in light of “the reduction in costs by using the AI in generating the works ... to safeguard the rights of traditional authors from being replaced by the cheaper labour of AI”).

193 Grubow, “O.K. Computer” (2018) 40 Cardozo Law Review 409, 416.

194 See also Sobel, “Artificial Intelligence’s Fair Use Crisis” (2017) 41 Colum. J.L. & Arts 45, 91, proposing the introduction of levies on machine learning to compensate copyright owners and in general human creators, for example, by channeling the proceeds of the levy to artistry charities (it may be argued that a similar system could also be engineered in the context of a sui generis right). In exchange for a levy system, Sobel moreover argues in his article, AI companies and individuals could be exempted by law from any liability for copyright infringement, which would guarantee the future of these technologies. Sobel further notes that the judiciary could also award owners of copyright over the source material compensation on a

case-by-case basis, without, however, allowing them to obtain injunctions aimed at stopping expressive machine learning. The idea of charging AI systems a fee to compensate creators of works that have been fed into creative machines is not new. A compulsory licence fee to be paid to AI creators was proposed in 1994 by Vigderson, “Hamlet II: The Sequel” (1994) 28 Loy. L.A. L. Rev. 401, 431. See also the more recent 2017 draft report to the European Parliament’s Commission on Civil Law Rules on Robotics (rapporteur Mady Delvaux), which highlighted “the possible need to introduce corporate reporting requirements on the extent and proportion of the contribution of robotics and AI to the economic results of a company for the purpose of taxation and social security contributions”.

AIPPI Summary Report, p.13 (UK Group position).

AIPPI Summary Report, p.16 (UK and Singapore Groups position).

CDPA s.4(1).

AIPPI Summary Report, pp.16–17 (UK Group position).

AIPPI Summary Report, pp.16–17 (UK Group position).

AIPPI Summary Report, pp.16–17 (UK Group position). Finally, no moral rights should follow the introduction of this *sui generis* form of protection. After all, UK copyright law currently excludes the applicability of moral rights to computer-generated works. On the inappropriateness of the *proximity* approach when it comes to attributing copyright in AI-generated artworks, see Megan Svedman, “Artificial Creativity: A Case Against Copyright for AI-Created Visual Artwork” (2020) 1 IP Theory 5.

See also Toby Bond and Sarah Blair, “Artificial Intelligence & Copyright: Section 9(3) or Authorship Without an Author” (2019) 14 J.I.P.L.P. 423 (noting that the solution may lie in recognising computer-created works as deserving of only economic rights similar to those offered to movies, broadcasts, sound recordings and typographical arrangements). After all, a *sui generis* approach had been advocated by Karl Milde back in 1969: see Milde, “Can a Computer Be an ‘Author’ or an ‘Inventor’?” (1969) 51 J. Pat. 378, 402 (stressing “the necessity of a new type of protection, *sui generis* to the problem of computer talk, which would also make practical the enforcement of any right granted”).

Florian De Rouck, “Moral Rights & AI Environments: the Unique Bond between Intelligent Agents and their Creations” (2019) 14 J.I.P.L.P. 299.

Miller, “Copyright Protection for Computer Programs, Databases, and Computer-Generated Works” (1993) 5 Harvard Law Review 977, 1045.

Carys Craig and Ian Kerr, “The Death of the AI Author” (2019, copy on file with authors).

Miller, “Copyright Protection for Computer Programs, Databases, and Computer-Generated Works” (1993) 5 Harvard Law Review 977, 1066. Yet, see also Grimmelmann, “There’s No Such Thing as a Computer-Authored Work” (2016) 39 Colum. J. L. & Arts 377, 414 (arguing against computer authorship in the immediate future, but acknowledging that “it is possible that some future computer programs could qualify as authors. We could well have artificial intelligences that are responsive to incentives, unpredictable enough that we can’t simply tell them what to do, and that have attributes of personality that make us willing to regard them as copyright owners”).

Liza Vertinsky and Todd Rice, “Thinking about Thinking Machines – Implications of Machine Inventors for Patent Law” (2002) 8 Boston University Journal of Science & Technology Law 578.

Samuelson, “Allocating Ownership Rights in Computer-Generated Works” (1985–86) 47 U. Pitt. L. Rev. 1185, 1199.

Yanisky-Ravid, “Generating Rembrandt: Artificial Intelligence, Copyright, and Accountability in the 3A Era” [2017] Mich. St. Law Review 659, 702.

- 209 Gervais, “The Machine as Author” (2019) 105 Iowa Law Review 1.
- 210 Lim, “AI & IP: Innovation & Creativity in an Age of Accelerated Change” (2018) 52 Akron Law Review 813. See also Dornis, “Artificial Creativity: Emergent Works and the Void in Current IP Doctrine” (2020) 22 Yale Journal of Law & Technology 1, 8 (noting that “subject matter of even minuscule creativity (such as works of simple handcraft) has been promoted to the status of full copyright protection throughout the world. Meanwhile, the copyright protection of AI-generated works remains virtually unattainable due to that fact that *human* creativity is indispensable for such protection”).
- 211 Denicola, “Ex Machina: Copyright Protection for Computer-Generated Works” (2016) 69 Rutgers L. Rev. 251, 270. See also de Cock Buning, “Autonomous Intelligent Systems as Creative Agents under the EU framework for Intellectual Property” (2016) 7 E.J.R.R. 310 (noting that “if courts no longer assess the author, but rather the work he created, regardless of the process by which he came by it, the result of machine creativity could be compared to the result of human creativity objectively, without ‘prejudice’”).